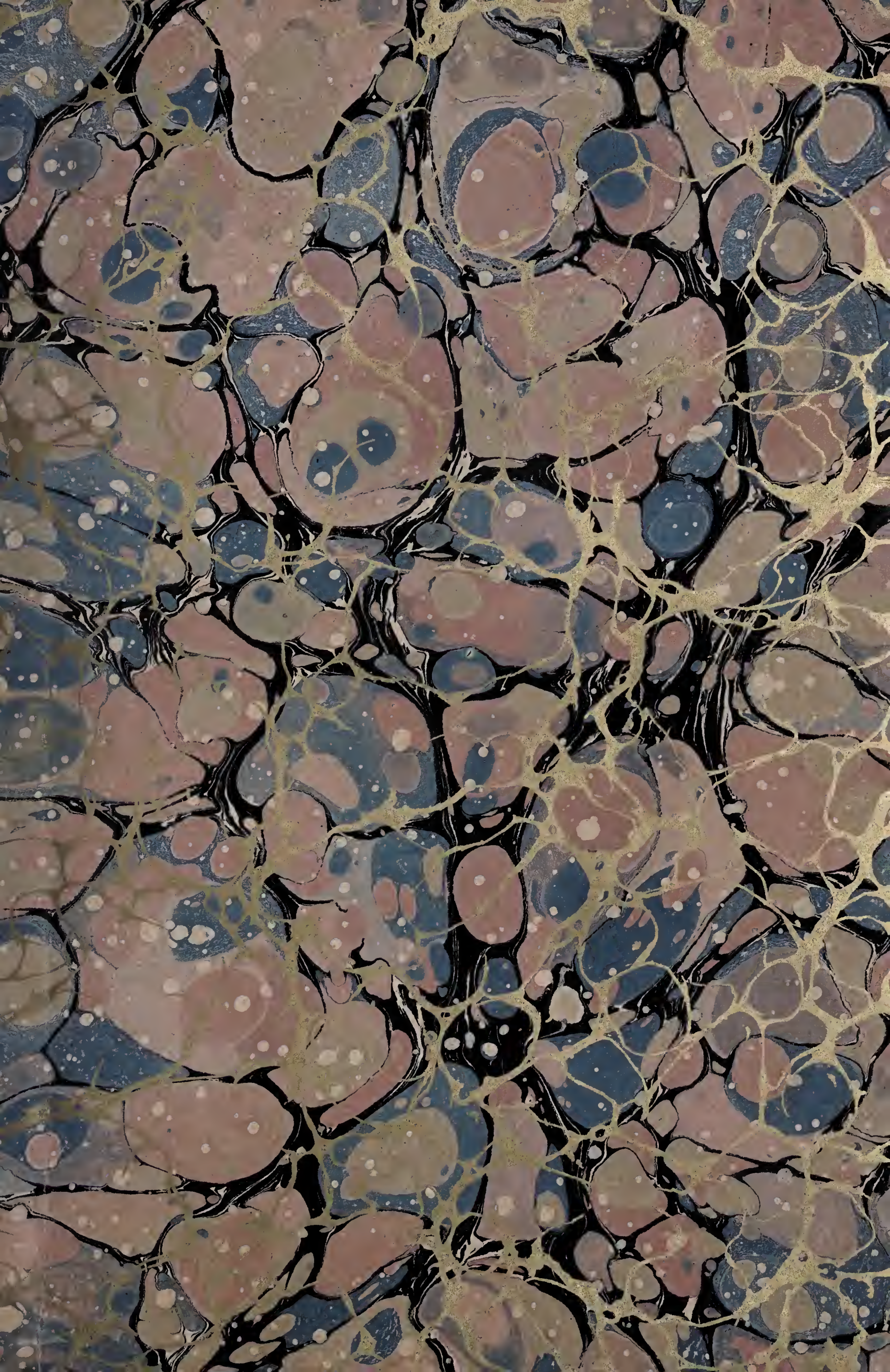
Class AE5
Book N285
Copyright No.
COPYRIGHT DEPOSIT.



Copr. 1911, J. C. W. Co. AMERICAN TREE LEAVES, FLOWERS AND FRUITS

1. Black oak. 2. White ash. 3. White oak. 4 White elm. 5. Cucumber tree. 6. Yellow poplar. 7. Sycamore or Buttonwood. 8. Sugar maple. 9. Red cedar. 10. Sweet or Red gum.

THE NATIONAL ENCYCLOPEDIA OF REFERENCE

AUTHORITATIVE PRACTICAL COMPLETE

AN AMERICAN LIBRARY

—EMBRACING—

SCIENCE SOCIOLOGY PHILOSOPHY
HISTORY FINE ARTS LANGUAGES
RELIGION LAW LITERATURE
USEFUL ARTS

—AND—

THE MANY THOUSANDS OF SUBJECTS
INTO WHICH THEY BRANCH

—EDITED BY—

FRANCIS T. FUREY, M.A.
WALTER HART BLUMENTHAL, B.S.E.
CHARLES ANNANDALE, M.A., LL.D.

—ASSISTED BY—

A LARGE BODY OF THE MOST EMINENT AUTHORITIES
IN THE VARIOUS DEPARTMENTS

NEW YORK PHILADELPHIA LONDON
STANDARD BOOKBINDING CO.
1912

AE5
.N285

Copyright 1912
AMERICAN EDUCATIONAL ASSOCIATION

COPYRIGHT 1912
THE JOHN C. WINSTON CO.

©Cl.A354438
201

KEY TO PRONUNCIATION

Three methods are used to indicate the pronunciation of the words forming the headings of the separate articles:

(1) By dividing the word into syllables, and indicating the syllable or syllables to be accented. This method alone is followed where the pronunciation is entirely obvious. Where accent marks are omitted, the omission indicates that all syllables are given substantially the same value.

(2) Where the pronunciation differs from the spelling, the word is re-spelled phonetically, in addition to the accentuation.

(3) Where the sound values of the vowels are not sufficiently indicated merely by an attempt at phonetic spelling, the following system of diacritical marks is additionally employed to approximate the proper sounds as closely as may be done:

ā, as in f*a*te, or in b*a*re.
ä, as in *a*lms, Fr. *â*me, Ger. B*a*hn = á of Indian names.
å, the same sound short or medium, as in Fr. b*a*l, Ger. M*a*nn.
a, as in f*a*t.
ą, as in f*a*ll.
a, obscure, as in rur*a*l, similar to *u* in b*u*t, ė in h*e*r: common in Indian names.
ē, as in m*e* = *i* in mach*i*ne.
e, as in m*e*t.
ė, as in h*e*r.
ī, as in p*i*ne, or as *ei* in Ger. M*ei*n.
i, as in p*i*n, also used for the short sound corresponding to ē, as in French and Italian words.
eu, a long sound as in Fr. je*û*ne, = Ger. long *ö*, as in Söhne, Göthe (Goethe).
eu, corresponding sound short or medium, as in Fr. p*eu* = Ger. *ö* short.
ō, as in n*o*te, m*oa*n.
o, as in n*o*t, s*o*ft—that is, short or medium.
ö, as in m*o*ve, t*wo*.
ū, as in t*u*be.
u, as in t*u*b: similar to ė and also to *a*.
ų, as in b*u*ll.
ü, as in Sc a*bu*ne = Fr. *û* as in d*û*, Ger. *ü* long as in gr*ü*n, B*ü*hne.
ů, the corresponding short or medium sound, as in Fr. b*u*t, Ger. M*ü*ller.
oi, as in *oi*l.
ou, as in p*ou*nd; or as *au* in Ger. H*au*s.

The consonants, b, d, f, h, j, k, l, m, n, ng, p, sh, t, v, and z, when printed in Roman type, are always given their common English values in the transliteration of foreign words. The letter c is indicated by s or k, as the case may be. For the remaining consonant sounds the following symbols are employed:

ch is always as in ri*ch*.
d, nearly as *th* in *th*is = Sp. *d* in Ma*d*ri*d*, etc.
g is always hard, as in *g*o.
h represents the guttural in Scotch lo*ch*, Ger. na*ch*, also other similar gutturals.
ņ, Fr. nasal *n* as in bo*n*.
r represents both English *r*, and *r* in foreign words, in which it is generally much more strongly trilled.
s, always as in *s*o.
th, as *th* in *th*in.
th, as *th* in *th*is.
w always consonantal, as in *w*e.
x = ks, which are used instead.
y always consonantal, as in *y*ea (Fr. *ligne* would be re-written lēny).
zh, as *s* in pleasure = Fr. *j*.

VOLUME VII

Orpheus (or'fūs), a personage of great importance in the mythology of Greece, surrounded by a multitude of legends, which invariably associate him with Apollo and the Muses. To him is attributed the application of music to the worship of the gods. Apollo presented him with his lyre, and the Muses instructed him to use it, so that he moved not the beasts only, but the woods and rocks with its melody. Having lost his wife Eurydice by the bite of a serpent he descended to Hades to try and get her back. His music so moved the infernal deities Pluto and Proserpine that they consented to her return to earth, only her husband, whom she was to follow, must not look back till they had reached the upper world. This condition the impatient Orpheus violated and lost his wife forever. He is said to have met his death at the hands of a band of furious women engaged in the mystic rites of Bacchus. He is represented as one of the Argonauts, and to him is ascribed the origin of the so-called Orphic mysteries connected with the worship of Bacchus. A considerable literature was connected with the name of Orpheus, the oldest portions of which were not earlier than 530 B.C. In part it yet exists, there being still extant a mythological poem called *Argonautica*, certain hymns, etc.

Orpiment (or'pi-ment), a mineral consisting of arsenic and sulphur, of a bright yellow color, passing into golden; specific gravity, 3.3-3.5. It occurs in laminated or lamellar masses, in concretions, and more rarely in minute crystals. It is also manufactured artificially.

Orrery (or'e-ri), an instrument for representing the motions of the planets, etc., a useful assistant to the teacher of elementary astronomy. It was so-called after the Earl of Orrery.

Orrery, CHARLES BOYLE, EARL OF, born in 1676; died in 1731. He was educated at Oxford, and succeeded his brother in the earldom (an Irish title) in 1708. For his services in connection with the Treaty of Utrecht he was created a British peer, as Lord Boyle. He published an edition of Phalaris, which gave rise to the controversy with Dr. Bentley. See *Bentley, Richard.*

Orris Root (or'is), or IRIS ROOT, the root of several species of *Iris*, especially of the *I. florentina*, which on account of its violet-like smell is employed in perfumery and in the manufacture of tooth-powder. It is also used in pharmacy as a pectoral.

Orsini (or-sē'nē), one of the most illustrious and powerful families of Italy. It became known about the eleventh century, and had already acquired high rank and extensive possessions in the Papal States when one of its members, Giovanni Gaetano, was raised to the pontificate under the title of Nicholas III (1277-80). The feud between the Orsini and Colonna families is celebrated in history; it commenced towards the close of the thirteenth century, and is distinguished for bitterness, unscrupulousness and violence, assassination being not infrequently resorted to. Many of the Orsini became famous military chiefs. Vincenzo Marco Orsini (Benedict XIII) succeeded Innocent XIII as pope in 1724. (See *Benedict.*) The Orsini family is now divided into two branches, the Orsini-Gravina at Rome and the Orsini who reside at Piedmont.

Orsini, FELICE, an Italian revolutionist, born in 1819. In 1838 he was sent to study law at the University of Bologna, and joined the Society of Young Italy, formed in 1831 by Mazzini. In 1843 he took an active part in an insurrection, and being apprehended along with his father, also an ardent patriot, was sentenced to the galleys for life. By the amnesty of July 16, 1846, he obtained his freedom, but soon after he again engaged in intrigues under Mazzini, and took prominent part in the stirring events of the following years. In 1855 he was condemned to death, but the sentence was not carried out, and in 1856 he escaped to London. Here he wrote his work, *Austrian Dungeons in Italy* (1856), and lived by giving lectures on his adventures. He now planned the assassination of Napoleon III, as the main prop of reactionary tendencies in Europe, in concert with three Italian refugees, Rudio, Gomez and Pieri. The attempt was made on January 14, 1858, but was unsuccessful, and Pieri and Orsini were executed March 13, 1858, Gomez and Rudio being sentenced to imprisonment for life.

Orsk (ōrsk), a town of Russia, government of Orenburg, near the mouth of the Or, in the Ural. Pop. 14,036.

Orsova (or'sho-vå), NEW ORSOVA, the name of two places near the Iron Gates of the Danube, the former a small town in Hungary, the latter a fortress in Servia, occupied by the Austrians.

Orsted, or OERSTED (eur'sted), HANS CHRISTIAN, a Danish physicist, born in 1777; died at Copenhagen in 1851. He studied at the University of Copenhagen, spent several years at the expense of government in Holland, Germany and Paris; was in 1806 appointed extraordinary professor of physics at Copenhagen; and in 1812-13, while on a second tour in Germany, he drew up his views of the chemical laws of nature, which he afterwards published in Paris under the title of *Recherches sur l'Identité des Forces Electriques et Chimiques.* His fame first became diffused over the scientific world in 1819 by the discovery of the fundamental principles of electromagnetism. In 1829 he became director of the Polytechnic School of Copenhagen, and on the occasion of his jubilee festival in 1850 he was created a privy-councilor.

Ortegal (or-tā-gäl'), CAPE, the northwestern point of Spain.

Orthez (or-tās), a town of France, department of Basses-Pyrénées, 24 miles northwest of Pau, on a hill above the Gave-de-Pau. Soult was here defeated by Wellington, February 27, 1814. Pop. (1906) 4159.

Orthite (ōr'thīt), a silicate of aluminium containing the rare metals cerium, lanthanum, didymium, and yttrium, occurring in granite and other rocks in Sweden, Greenland, the Ural, etc.

Orthoceras (ōr-thos'ėr-as), a genus of fossil cephalopods, having straight or slightly curved chambered shells, allied to the nautilus, and occurring from the Silurian to the Trias.

Orthoclase (orth'ō-klāz), called also the common or potash felspar, a silicate of aluminium and potassium found in fine monoclinic crystals disseminated in straight layers throughout the older rocks of many countries. The color varies from white to green; it is transparent or translucent; specific gravity, 2.4 to 2.6; hardness, 6.

Orthodox (ōr'thu-doks; Greek, *orthos*, right, and *doxa*, opinion), the opposite of *heterodox* (which see), generally applied to what is regarded as the established opinion, or that which is commonly considered as right. The term is chiefly used in religious controversies to designate certain religious faiths or doctrines.

Orthoepy (ōr-thō'e-pi), that branch of grammatical knowledge which deals with correct pronunciation.

Orthographic Projection, a term more specially applied to that spherical projection used by geographers in the construction of maps in which the eye is supposed to be at an infinite distance from the sphere, so that the rays of light coming from every point of the hemisphere may be considered as parallel to one another. This method of projection is best adapted for representing countries at a moderate distance from the center of projection. See *Projection.*

Orthography (ōr-thog'ra-fi), that part of grammar which treats of the nature and properties of letters, and their proper application in writing words, making one of the four main divisions or branches of grammar. The word is also used in architecture.

Orthopædia (ōr-thu-pē'di-a; Greek, *orthos*, straight, *paideia*, training), a branch of medical science relating to the cure of natural deformities. Hippocrates already occupied himself with the correction of deformed bones, but it was not until a comparatively recent epoch that this important subject met with the serious attention it

deserves. Several institutions for the cure of bodily malformations were founded in France and Germany in the early part of the nineteenth century. Orthopædia is divided into prophylactic or preventive, and therapeutic or curative. The object of the former is to prevent deformities in infants, and is obtained by hygienic means, such as pure air, careful nursing, and suitable food, clothing and exercise; that of the latter to correct deformities already existing by mechanical treatment, which is most successful when resorted to as soon as any deviation from natural shape manifests itself. In our time the manufacture of orthopædic apparatus has become highly developed, and forms an important branch of trade.

Orthoptera (ōr-thop'te-rȧ; Greek, *orthos*, straight, *pteron*, a wing), an order of insects of the subclass Hemimetabola, or insects in which the metamorphosis is incomplete. They have four wings, the anterior pair being semicoriaceous or leathery, usually with numerous nervures, the wings sometimes overlapping and sometimes meeting like the roof of a house. The feelers are generally straight, filiform organs. The limbs vary in conformation according to their methods of movement. In their metamorphosis the larvæ and pupæ are both active, and the pupa generally resembles the perfect insect, the wings being undeveloped. These insects are divided into Running (Cursorial) and Leaping (Saltatorial) Orthoptera. Of the former division the Cockroaches, Earwigs, Mantis Insects, Walking-stick Insects, and Walking Leaves form the chief families. The Saltatoria are represented by the Locusts, some of which want wings entirely. Crickets and Grasshoppers. See also *Entomology*.

Ortler-Spitze, or ORTLER (ōrt'lėr), a mountain of the Alps, in Tyrol, near the borders of Switzerland and Italy, the highest of the Austrian and German Alps; height, 12,814 feet. The group to which this mountain belongs is known as the Ortler Alps.

Ortolan (or'tu-lan; *Emberiza hortulāna*), a bird of the bunting family, a native of Northern Africa and Southern Europe. The colors are yellow on the throat and around the eyes, the breast and belly being of reddish hue, while the upper part of the body is brown varied with black. Its delicate flesh is much esteemed by epicures, and large quantities are annually caught and fattened for the table in the south of France, Italy and Cyprus.

Orton (ōr'ton), EDWARD, geologist, born at Delhi, New York, in 1829; died in 1899. He was professor of natural science in the New York Normal School at Albany 1856-59, at Antioch College 1865-69, president of Antioch College 1872-73, president of the Ohio State University 1873-81, and in 1881 became state geologist of Ohio and professor of geology in the university. He wrote several volumes on the *Geology of Ohio*. He was president of the Geological Society of America in 1897 and of the Association for the Advancement of Science 1898-99.

Orton, JAMES, scientist, born at Seneca Falls, New York, in 1840. He made two exploring expeditions to South America and in 1869 was made professor of natural history in Vassar College. He wrote *The Andes and the Amazon*, *Underground Treasures*, *Comparative Zoölogy*, *The Liberal Education of Women*, *Proverbialist and Poet*, etc.

Ortona (or-tō'na), a town and seaport of Southern Italy, province Chieti, on the Adriatic, 11 miles east of Chieti. It has a cathedral and several other churches and convents. Pop. 8667.

Ortyx (ōr'tiks), an American genus of gallinaceous birds allied to the quails and partridges. See *Quail*.

Oru'ba. See *Aruba*.

Oruro (ō-rö'rō), a town of Bolivia, capital of a department of the same name, on a bleak hill in a metalliferous district, at an absolute height of 13,000 feet. It has lost its former importance, and the population, once exceeding 40,000 is now 16,070. The department has an area of 19,000 square miles and a pop. of 86,081.

Orvieto (or-vē-ā'tō), an old town of Italy, province of Perugia, picturesquely situated on an isolated hill near the confluence of the Paglia and the Chiana, 60 miles N. N. W. of Rome. It is celebrated for its cathedral, built of black and white marble, and adorned with fine sculptures, mosaics and paintings, a beautiful specimen of thirteenth century Italian Gothic. Pop. 8820.

Orycteropus (or-ik-tėr'o-pus), the generic name of the aardvark, Cape pig, or ground-hog (*O. Capensis*) of South Africa, an edentate, insectivorous animal. See *Aardvark*.

Oryx (or'iks), the name of the genus of antelopes represented by the addax (*Oryx nasomaculata*) and by other species, found in large herds chiefly in the northern portions of the African continent. The horns are very long, spiral, and curved backwards. The gemsbok

(*Oryx Gazella*) of Southern Africa is another species included in this genus.

Osage (ō′sāj), a river in the United States, which rises in Kansas, flows through Missouri, and after a winding course of 500 miles joins the Missouri 10 miles below Jefferson City. The river gave name to an Indian tribe, the remnant of which now inhabit the Indian Territory.

Osage Orange (*Maclūra aurantiăca*), a tree of the nat. order Moraceæ (mulberry), indigenous to North America, where it is frequently used as a hedge-plant. It produces a large yellow fruit of a woody texture, somewhat resembling an orange, but not edible.

Osaka (ō′zȧ-kä), or OHOSA′KA, the second city and a free port of Japan, in the island of Hondo, on the estuary of the Yodo Gawa, 28 miles S. S. W. of Kioto. It is intersected by canals, which are spanned by numerous wooden bridges. The banks of the main channel are lined for 2 or 3 miles with the residences of the nobles, and it has a strong citadel. A railway connects it with Yeddo. The greater part of its foreign trade is carried on at Hiogo. It has arsenals, machine shops, steel and glass works, cotton and woolen mills, boot and shoe and match factories, etc. It is sometimes called the 'Venice of Japan,' there being more than 1200 bridges, while the population lives chiefly on the water. It has over 1900 places of worship, and takes a leading part in social affairs. Pop.(1908) 1,117,151.

Oscans (os′kanz; L. *Osci;* Greek, *Opikoi*), an Italian people who appear to have been the occupants, at the earliest known period, of Central Italy. The Oscans were subdued by the Sabines or Sabellians. Their language was closely allied to the Latin. Some wall-inscriptions in it have been found in Pompeii. There are no remains of it except in coins and inscriptions.

Oscar I (os′kar), JOSEPH FRANÇOIS BERNADOTTE, King of Sweden and Norway, son of Bernadotte (Charles XIV), born at Paris in 1799; died in 1859. In 1823 he married Joséphine, eldest daughter of Prince Eugéne Beauharnais. During the reign of his father he was three times (in 1824, 1828 and 1833) viceroy of Norway, where he made himself popular by his good administration. He acceded to the throne in 1844; reformed the civil and military administration of the state; abolished primogeniture; established complete liberty of conscience; encouraged education and agriculture; promoted railways, telegraphs, etc. He took little part in foreign politics. He resigned in favor of his eldest son in 1857.

Oscar II, King of Sweden and Norway, born in 1829; succeeded his brother, Charles XV, in 1872. He was a writer of some merit; translated Goethe's *Faust* into Swedish, wrote a *Life of Charles XII,* and published a volume of poems under the pen name of Oscar Frederik. During his reign Norway seceded from Sweden and established a separate kingdom. He died in 1907, and was succeeded by his son Gustavus V.

Osceola (os-se-ō′la), a Seminole Indian chief, born in Florida about 1813. His wife being claimed and carried off as a slave in 1835, he declared war against the whites and fought with them for two years with varying success. He was finally taken prisoner by treachery and confined in Fort Moultrie, where he died in 1837.

Oschatz (ō′shȧts), a town of Saxony, about 30 miles to the east of Leipzig, with manufactures of woolens, leather, etc. Pop. 10,854.

Oschersleben (ōsh-ėrs-lā′ben), a town of Prussian Saxony, on the Bode, 19 miles S. W. of Magdeburg. It has sugar and agricultural machine works, etc. Pop. 13,271.

Oscillation (os-i-lā′shun), the act of swinging to and fro. The term is often indiscriminately applied to all sorts of forward and backward motions, but it has special reference to the movements of the pendulum, which are subject to well-established laws. See *Pendulum.*

Osel (ō′zel), an island in the Baltic Sea, forming part of the Russian government of Livonia. It lies across the entrance of the Gulf of Riga and has an area of 1010 sq. miles. Agriculture, horse-breeding and fishing are the principal occupations. Chief town, Arensburg. Pop. about 42,000.

Oshawa (osh′ȧ-wȧ), a town of Ontario County, province of Ontario, Canada, on Lake Ontario, 33 miles N. E. of Toronto. It has a lake trade, canning and evaporating industries, and various manufacturers. Pop. (1911) 7436.

Oshkosh (osh′kōsh), a city of Wisconsin, capital of Winnebago County, situated on Lake Winnebago at the mouth of Fox River, 49 miles S. S. W. of Green Bay. It has steamboat connection with Green Bay, and with the Mississippi River via Fox and Wisconsin Rivers. It has very large lumbering and flouring industries, numerous saw mills and a considerable variety of other indus-

VIEW OF OSAKA, JAPAN

tries. It is a favorite fishing and summer resort, and has a State normal school and (nearby) a State insane asylum. Pop. 33,062.

Osiander (o-zi-an′dėr), ANDREAS, a German theologian, zealous reformer, and follower of Luther, born in 1498; died in 1552. He was present at the Diet of Augsburg in 1530, and his refusal to consent to the Augsburg interim in 1548 cost him his situation as preacher at Nürnberg, but soon after he was appointed professor of theology in the newly-erected University of Königsberg. Afterwards he was appointed vice-president of the bishopric of Samländ. In 1549 he became involved in a theological dispute, in which he maintained that justification is not a judicial or forensic act in God, but contained something of a subjective nature, as the imparting of an internal righteousness, brought about in a mystical manner by the union of Christ with men. One of his principal opponents was Martin Chemnitz. Although his views were condemned by several authorities he maintained them until his death. In 1556 all the Osiandrists were deposed, and Osiandrism forever banished out of Prussia.

Osier. See *Willow.*

Osiris (o-sī′ris), one of the great Egyptian divinities. He was the brother and husband of Isis, and the father of Horus. He is styled the Manifestor of Good, Lord of Lords, King of the Gods, etc. In the Egyptian theogony he represented the sum of beneficent agencies, as Set of evil agencies. Osiris, after having established good laws and institutions throughout Egypt, fell a prey to the intrigues of his brother Set, the Typhon of the Greeks. He became afterwards the judge of the dead. There are a multitude of traditions, both Greek and Egyptian, about Osiris. He is represented under many different forms, and compared sometimes to the sun and sometimes to the Nile. His soul was supposed to animate the sacred bull Apis, and thus to be continually present among men. His worship extended over Asia Minor, Greece and Rome; the rise of Christianity put an end to it.

Osiris.

Oskaloosa (os-ka-lö′sa), a city and the capital of Mahaska County, Iowa, in one of the best coal regions of the West. It lies on the water-shed between the Des Moines and South Skunk Rivers, 62 miles S. E. of Des Moines. It contains the Oskaloosa and law colleges and has bridge works and foundries, steam heater, brick and tile, clothing, and other factories. Pop. 9466.

Osmanieh (os-man′i-e), a Turkish order established by Abdul Aziz in 1861 for the reward of services rendered to the state. The chief decoration is a golden six-pointed star enameled in green.

Osman Pasha (os-man′ pa-sha′), a Turkish general, born at Tokat, Asiatic Turkey, in 1832; entered the Turkish army in 1853; fought with distinction in the Crimean war, the Syrian rebellion, and the Crete campaign, but his great achievement was the gallant and protracted defense of Plevna during the Russo-Turkish war (1877). After that he held the office of war minister and several other high posts. He died in 1900.

Osmelite (os′me-līt), called also *pectolite*, a white or grayish-white mineral which occurs in many localities in acicular monoclinic crystals, consisting of hydrated silicate of calcium and sodium.

Osmium (os′mi-um; symbol Os, atomic weight 199), one of the platinum metals, forming a bluish-white lustrous mass, having a specific gravity of 22.48, being thus the heaviest of all bodies. It may also be obtained in crystals, or as a black amorphous powder, which is very combustible. Osmium is the most infusible of all the metals. It combines with chlorine in different proportions, also with sulphur, and forms alloys with some other metals. Osmic acid acts as a powerful oxidizer, decarbonizing indigo, separating iodine from potassium iodide, converting alcohol into acetic acid, etc.

Osmosis (os-mō′sis), OS′MOSE, the tendency of fluids to pass through porous partitions and mix or become diffused through each other. It includes *endosmose*, or the tendency of a fluid to pass inwards into another through such a partition, and *exosmose*, or the tendency of a fluid outward. When two saline solutions, differing in strength and composition, are separated by a bladder, parchment paper, or porous earthenware, they mutually pass through and

mix with each other; but they pass with unequal rapidities, so that, after a time, the height of the liquid on each side is different. Of all vegetable substances sugar has the greatest power of endosmose, and of animal substances albumen has the greatest. Graham showed that osmose was due to the chemical action of the fluids on the septum. In fact, the corrosion of the septum seems necessary for the existence of osmose. See also *Diffusion.*

Osmunda (os-mun'da), a genus of ferns, of the section Osmundaceæ, with free capsules opening by a longitudinal slit into two valves, no elastic ring, or instead of one a striated cup. The *Osmunda regālis*, the flowering or royal fern, which grows to the height sometimes of 10 feet, is a native of various parts of the Old World as well as of North America. It is often cultivated as an ornamental plant on account of its elegant appearance, the fructification forming a fine panicle somewhat resembling that of a flowering plant.

Osnabrück (ōs-na-brük'), or OSNABURG, an ancient town of Prussia, in Hanover, on the Hase, and 71 miles west of Hanover. In the old town it possesses many interesting buildings in Gothic and Rennaissance style. It was formerly an important seat of linen manufacture, and gave the name to the kind of coarse linen known as osnaburg. Its chief manufactures are now chemicals, iron and steel, paper, cotton and tobacco. It is the see of a bishop, and the seat of several courts and public offices. Pop. 59,580.

Osprey (os'prā; *Pandīon Haliaëtus*), a well-known raptorial bird, called also *fishing-hawk*, *fishing-eagle* and *sea-eagle*. It occurs both in the Old and New World, near the shores of the sea, or great rivers and lakes, and builds its nest in high trees and cliffs. It lives on fish, and pounces with great rapidity on its prey, as it happens to come near the surface of the water, the toes being armed with strong curved nails. The general body-color is a rich brown, the tail being banded with light and dark (in the old birds the tail is pure white), head and neck whitish on their upper portions, and a brown stripe extends from the bill down each side of the neck; under parts of the body whitish, legs of a bluish tint. In length the osprey averages about 2 feet, the wings measuring over 4 feet from tip to tip. The female lays three or four eggs. The American bald-eagle (*Haliaëtus leucocephălus*) pursues the osprey, who drops his prey with the view of escaping, when the eagle immediately pounces after the descending fish, and seizes it before it has time to touch the water.

Ossa (os'sa), a mountain of Northern Greece, in Thessaly, separated by the Vale of Tempe from Mount Olympus; height, 6348 feet.

Osprey (*Pandion Haliaëtus*).

Ossetes (os-sēts'), one of the numerous tribes or peoples inhabiting the Caucasus, belonging to the Indo-European or Aryan family, and to the Iranic branch of it. They are at a lower stage of civilization than some of the neighboring peoples. Their religion consists of a strange mixture of Christianity, Mohammedanism and Paganism. They number about 110,000.

Ossett (os'set; with Gawthorpe), a town of England, W. Riding of Yorkshire, 22 miles from Wakefield, with woolen mills, etc. Pop. 14,081.

Ossian (osh'i-an), a personage of ancient Scottish or rather Irish history, to whom are attributed certain poems, the subject of a great literary controversy of the latter half of the eighteenth century and the commencement of the present one. It originated by the publication of two epics, *Fingal* (1762) and *Temora* (1763) by James Macpherson. (See *Macpherson, James.*) Both are a record of the deeds of a great Celtic hero, Fingal. In the first of these poems he is assumed to war with the Danes, leading to their ultimate expulsion; but in *Temora* he is placed farther back, and his struggles are with the Romans. These and some minor poems Macpherson attributed to Ossian, the son of Fingal, and alleged that his version was a literal translation of works which had been transmitted orally in the Gaelic language from bard to bard until the introduction of writing permitted them to

be committed to manuscript. Immediately on the publication of *Fingal* it attained an immense popularity. It was translated within a year into all the principal languages of Europe, and numbered among its admirers the ripest scholars and the most distinguished men of genius of the age. The question of authenticity which was raised immediately on the publication of *Fingal* was noticed with somewhat lofty disdain by Macpherson in his preface to *Temora*, and although he then professed to be able to meet it by the production of the originals, he generally maintained throughout the controversy an angry silence. At first the authority of Dr. Blair, who wrote an elaborate critical dissertation in favor of the authenticity of the poems, was regarded as of paramount authority throughout Europe; and notwithstanding the emphatic denunciation of Dr. Johnson, and objections of other critics, the believers in the genuineness of *Ossian* continued to hold their ground until Malcolm Laing's unsparing criticism, first in the introduction to his *History of Scotland* (1800), and afterwards in an annotated edition of the poems themselves 1805), gave a death blow to the position of those who maintained the integrity of the Ossianic epics. In 1797 the Highland Society issued a committee to inquire into the authenticity of the poems. The report published in 1805 states that the committee had not been able to obtain any one poem the same in title and tenor with the poems published by Macpherson; that it was inclined to believe that he frequently supplied chasms, and gave connection by inserting passages which he did not find, and added what he conceived to be dignity and delicacy to the original, by striking out passages, by softening incidents, by refining the language, etc., but that it was impossible to determine to what degree he exercised these liberties. In 1807, after the death of Macpherson and in accordance with his will, appeared the Gaelic originals of his poems, with a Latin translation, and accompanied by a new dissertation on their authenticity by Sir John Sinclair. Hence arose a new and singular controversy. It was asserted that these originals, the MSS. of which were all in the handwriting of Macpherson, were translated by himself from the English, and this charge seems to be about as well substantiated as that of the original fabrication. What appears really to have been decided, is that Ossian was a real or mythical Irish bard of the second or third century, of whom there are probably no authentic remains, although some brief poems, which cannot be traced further back than the eleventh century, are attributed to him. There are numerous traditions regarding him both in Scotland and Ireland. That Macpherson possessed considerable, and often conflicting material, collected in the Highlands, which he worked up into a continuous whole, in epic form, and that he himself produced the connecting links, seems beyond doubt.

Ossification (os-si-fi-kā'shun), the process of bone formation, which in all cases consists of the deposition of earthy or calcareous matter. It may take place by the deposition of osseous material in fibrous membranes, and thus the flat bones of the skull are developed; or by deposition in *cartilage*, as in the case of the long bones of the skeleton. The process of ossification in cartilage begins at various well-marked points called *centers of ossification*, where proliferation of cartilage cells and a deposit of lime salts occurs. (See also *Bone.*) Most organs of the body may become the seat of abnormal ossification. Deposits of limy matter take place frequently within the coats of arteries, making them easily ruptured; but this process is rather one of *calcification.*

Ossining (os'in-iŋg), a city of New York, in Westchester County, on the Hudson, 32 miles N. of New York city. It has large stove foundries, a large shoe factory, metal ware works, underwear factory, and various other industries. It was formerly called Sing Sing, and near by is the Sing Sing State Prison. Pop. 11,480.

Ossoli (os'so-lē), MARGARET SARAH FULLER, an American authoress, born in 1810; remarkable for her precocious and linguistic attainments. She became associated with Emerson and other eminent literary men. In 1840 she started and edited the *Dial* (a social philosophical magazine), and in 1844 became a writer to the *New York Tribune.* She visited Europe in 1846, married in 1847 the Marchese Ossoli; was in Rome during the siege of 1849, when she acted as superintendent of a hospital for the wounded, and embarked with her husband for New York, but they were wrecked, and both perished off Long Island, July 16, 1850. She wrote several works (besides translations), including *Women in the Nineteenth Century*, etc.

Ostade (os-tä'de), ADRIAN VAN, a painter of the Flemish school, and a pupil of Francis Hals, born at Lübeck in 1610; died at Amsterdam in 1685. The coarse enjoyments of Dutch peasants

formed the favorite subjects of his paintings, and the truth and animation he succeeded in throwing into his figures secured him a well-merited reputation. His pictures, amounting to several hundreds, are clear and rich in coloring, and highly finished. His brother and pupil, ISAAC VAN OSTADE, born in 1621; died in 1649, first imitated him, but was more successful in a style of his own (animated landscapes). He was often solicited by landscape painters to add his figures to their pieces.

Ostashkov (ås-täsh'kōf), a town of Russia, government of Tver, on Lake Seliger. It is favorably situated for trade, and its manufactures are progressing. Pop. 10,457.

Ostend (os-tend), a seaport of Belgium, province of West Flanders, on the North Sea, 67 miles northwest of Brussels. It is situated on a sandy plain, and is protected against the sea by a solid wall of granite. The entrance to the port is narrow, and dangerous in bad weather, but the basins within are very extensive. The cod and herring fishing, and the cultivation of oysters, are considerable industries, and the export of butter, eggs, poultry and rabbits is extensive. Owing to its extensive firm and smooth sands it is a favorite sea bathing resort, especially for continental visitors. It dates from the ninth century. It sustained a memorable siege by the Spaniards from July 4, 1601, to September 28, 1604, when it capitulated. Pop. 41,181.

Osteology (os-tē-ol'ō-ji), the department of anatomical science specially devoted to a description of the bony parts or skeleton of the body, and included under the wider science of anatomy (which see, as also *Skeleton*, *Bone*, etc.).

Osteopathy (os-tē-op'a-thi), a system of healing discovered and introduced by Dr. A. T. Still, of Baldwin, Kansas, in 1874, who reasoned that 'a natural flow of blood is health, and disease is the effect of local or general disturbance of the blood; that to excite the nerves causes muscles to contract and compress venous flow of blood to the heart; and that the bones can be used as levers to relieve pressure on nerves, veins and arteries.' Osteopathy relies upon the power of nature for the cure of disease without the use of drugs or other harmful agencies. The word is from the Greek, *osteon*, a bone; and *pathos*, suffering. A graduate in this science is a D.O. There are several colleges teaching Osteopathy in the United States.

Osterode (os-te-rō'dē), the name of two Prussian manufacturing towns: (1) Prussia in Hanover. Pop. 7467. (2) A town of East Prussia. Pop. 13,957.

Ostia (os'ti-ä), an ancient city of Italy, at the mouth of the Tiber, 6 miles from Rome by the Via Ostiensis. It was of great importance as the port of Rome and as a naval station, and for a long period it engrossed the whole trade of Rome by sea.

Ostiaks, or OSTYAKS (os'ti-akz), a race of Finnish origin, formerly numerous in several parts of Siberia, but which according to latest official returns now scarcely exceed 30,000, and are confined to the Obi and Irtish districts. In the latter they have become settled and Russianized, while in the former they mostly cling to their nomad life. They are generally low of stature, spare in figure, with dard hair, narrow eyes, large mouth and thick lips.

Ostracion (os-trā'si-on), the scientific name of the fishes known as trunk-fishes, included in the division Plectognathi, which forms a suborder of the Teleostei or bony fishes. The body is enclosed in a literal armor casing of strong bony plates or scales of the ganoid variety, which are immovably united, and

Ostracion or Trunk-fish (*O. triqueter*).

invest every part of the body save the tail, which is movable, but is itself enclosed in a bony casing. These fishes do not attain a large size, and are common in tropical seas.

Ostracism (os'tra-sizm; Greek, *ostrakon*, a shell), a political measure practiced among the ancient Athenians by which persons considered dangerous to the State were banished by public vote for a term of years (generally ten), with leave to return to the enjoyment of their estates at the end of the period. It takes this name from the shell or tablet on which each person recorded his vote. Among the distinguished persons ostracized were Themistocles, Aristides and Cimon, son of Miltiades, who were afterwards recalled.

Ostræ'a. See *Oyster*.

Ostrau (os'traụ), or MORAVIAN OSTRAU, a town of Austria, in Moravia, close to the frontier of Austrian Silesia, with coal mines, ironworks, etc. Pop. 30,125.—POLISH OSTRAU, which adjoins this town, in Austrian Silesia, is engaged in the same industries, and is in one of the richest coal fields of the empire. Pop. 18,761.

Ostrich (os'trich; *Struthio camēlus*), a cursorial bird, of the family Struthionidæ, of which it is the type. It inhabits the sandy plains of Africa and Arabia, and is the largest bird existing, attaining a height of from 6 to 8 feet. The head and neck are nearly naked; the general body plumage is black, the wing and tail feathers white, occasionally with black markings; the quill-feathers of the wings and tail have their barbs wholly disconnected, hence their graceful appearance. The legs are extremely strong, the thighs naked. There are only two toes, the hallux or hind toe being wanting. The public bones are united, a

African Ostrich (*Struthio camēlus*).

conformation occurring in no other bird. The wings are of small size and are incapable of being used as organs of flight, but the birds can run with extraordinary speed, outdistancing the fleetest horse. The bill is broad and of a triangular depressed shape. The food consists of grass, grain, etc., and substances of a vegetable nature, and to aid in the trituration of this food the ostrich swallows large stones, bits of iron and glass, or other hard materials that come in the way. Ostriches are polygamous, each male consorting with several females, and they generally keep together in flocks. The eggs average 3 lbs. in weight, and several hens often lay from ten to twelve each in the same nest, which is merely a hole scraped in the sand. The eggs appear to be hatched mainly by the exertions of both parents relieving each other in the task of incubation, but also partly by the heat of the sun. The South African ostrich is often considered as a distinct species under the name of *S. austrālis*. Three South American birds of the same family (Struthionidæ), but of the genus *Rhea*, are popularly known as the American ostrich, and are very closely allied to the true ostrich, differing chiefly in having the head feathered and three-toed feet, each toe armed with a claw. (See *Rhea*.) The ostrich has been hunted from the earliest ages for its feathers, which have always been valued as a dress decoration. The feathers of the back are those most valued, the wing and tail feathers rank next. The black plumes are obtained by dyeing. The finest white feathers are exported from Aleppo, Egypt, Tunis and Algiers, and the bulk of these find their way to Paris. Great Britain imports most of its ostrich feathers from Cape Colony. Ostriches having become scarce in that country, an attempt was made about 1858 to domesticate them, and with such success that ostrich farming forms an important source of wealth. They have also been domesticated to some extent in California and some other regions. The market value of the feathers naturally varies with their quality, the prevailing fashion, and the supply. At present prime white feathers fetch from $100 to $250 per lb. The exports of feathers from Cape Colony have sometimes exceeded $5,000,000 per annum.

Ostrog (ås'trok), an old town in Russia, government of Volhynia. It is the place where the Bible was first printed in Slavonic. Pop. 14,530.

Ostrogoths. See *Goths*.

Ostrowo (ōs-trō'vō), a town of Prussia, district Posen. It has manufactures of woolen cloths. Pop. 11,800.

Ostuni (ōs-tö'nē), a town of Southern Italy, province Lecce; olives and almonds are cultivated. Pop. 7734.

Osuna (ō-sö'na), a town of Southern Spain, in the province of and 41 miles east of Seville. It consists of spacious and well-paved streets, and has a magnificent church; manufactures of iron, linen, soap, articles in esparto, etc., and has a large trade in oil, grain, etc., with Seville and Malaga. Pop. 18,072.

Oswald (os'wold), King of Northumbria, 634-642. He ruled over an extensive territory, including Angles, Britons, Picts and Scots. He labored to

establish Christianity on a firm footing, being in this assisted by St. Aidan. He died in battle against Penda of Mercia, and was reverenced as a saint.

Oswald (os'wold), FELIX LEOPOLD, naturalist, born at Namur, Belgium, in 1845; went to Mexico with the Belgium volunteers in 1860, afterwards resided in the United States as correspondent of French and English journals. He wrote *Summerland Sketches*, *Days and Nights in the Tropics*, and other works of travel and natural history. He died in 1906.

Oswaldtwistle (o s ' w a ld-twis'l), a town of England in Lancashire, 3 miles from Blackburn, with cotton factories, print-works, etc. Pop. 15,720.

Oswego (os-wē'gō), a city and port of New York, capital of Oswego County, situated on the S. E. shore of Lake Ontario, at the mouth of Oswego River. It has a good harbor and large shipments of grain, lumber and coal, though the commerce as a whole is comparatively unimportant. It is beautifully situated, regularly and handsomely built, and is famous for its vast starch factory, said to be the largest in the world. It has also extensive mills, tanneries, foundries, machine shops and shipyards. The river supplies ample water power. The entrance to the port is guarded by Fort Ontario. There is here a State Normal School. Pop. 23,368.

Oswestry (oz'es-tri), a market town and municipal borough of England, county of Salop, 18 miles northwest of Shrewsbury. It is of great antiquity, deriving its name from Oswald, king of Northumbria, and makes some figure in early English history. Coal and limestone are worked in the neighborhood. There are railway workshops, agricultural implement works, breweries, etc. Pop. 9991.

Osymandyas (os-i-man'di-as), an ancient king of Egypt, mentioned by Diodorus Siculus, who reports that he invaded Asia with a vast army, and penetrated as far as Bactria, and that on his return he erected at Thebes a monument to himself of unparalleled magnificence, with a sitting colossal statue of enormous size. The Memnonium at Thebes has been represented as his monument.

Otago (ō-tä'gō), one of the provincial districts of New Zealand, including the whole of the southern part of the South Island, south of the districts of Canterbury and Westland, being surrounded on the other three sides by the sea; area about 23,400 sq. miles. The interior is mountainous; many peaks attain the height of from 3000 to 9000 feet, but there is much pastoral land; the N. E. consists of extensive plains. Otago, although it possesses valuable gold fields, is chiefly a pastoral and agricultural district, second only to Canterbury in wheat production. The climate is similar to that of Britain, but warmer and more equable. The largest river is the Clutha or Clyde, the largest of New Zealand. There are also extensive lakes, as the Te Anau, 132 sq. miles; the Wakatipu, 112 sq. miles in area. Coal has been found in abundance. Otago was founded in 1848 by the Scotch Free Church Association; it is now the most populous division of the colony. Otago Bay, or Harbor, on the S. E. side of the island, is important from having the towns of Dunedin and Port Chalmers on its shores. The capital is Dunedin; the next town in importance is Oamaru. Pop. 173,111.

Otaheite (o-ta-hī'tē). See *Tahiti.*

Otalgia (ō-tal'ji-a), a painful affection of the ear. It may be due to inflammation of the ear; it may be a symptom of other diseases; or, it may be a species of neuralgia. It is often associated with other nervous ailments such as toothache, and neuralgic pains in the face; and as its intensity and duration generally depend upon the condition of the latter, otalgia is probably only a local symptom of the other troubles. Children, especially during their fast-growing period, are frequently subject to otalgic pains. The treatment adopted in neuralgic affections is usually and with success also applied to this complaint.

Otaria (ō-ta'ri-a), a genus of seals. See *Seal.*

Otfrid (ot'fret), or OTFRIED, a German theologian, philosopher, orator and poet, who lived in the middle of the ninth century. He wrote a rhymed version or paraphrase of the Gospels, in old High German, still extant, in which there are some passages of lyrical poetry. He completed it about 868.

Othman. See *Caliph.*

Otho I (ō'thō), the GREAT, Emperor of Germany, son of Henry I, born in 912; died in 973. He was crowned king of Germany at Aix-la-Chapelle in 936. His reign of thirty-six years was an almost uninterrupted succession of wars. After a fourteen years' struggle he subdued Boleslas, duke of Bohemia; he wrested the duchies of Suabia. Bavaria and Lorraine from the Dukes of Bavaria and Franconia, and gave them (in 949) to his sons Ludolf

and Henry, and to his son-in-law Conrad, count of Worms, respectively. He delivered the Italians from the oppressions of Berengar II, married the widow of their last king, and was crowned king of Lombardy (951). In 961 he was crowned king of Italy, and in the following year emperor by Pope John XII, who took the oath of allegiance, but soon repented and took to arms. Otho deposed him and placed Leo VIII in the papal chair; he also punished the Romans for replacing John after his departure. The Byzantine court refused to acknowledge Otho's claim to the imperial dignity; but he defeated the Greek forces in Lower Italy, and the eastern emperor, John Zimisces, gave the Greek Princess Theophania to his son Otho in marriage.

Otho II, youngest son of Otho I, was born in 955; died at Rome in 983. His elder brothers had all died before their father, who caused him to be crowned king of Rome—the first instance of the kind in German history. He subdued the revolt of several powerful vassals, including his cousin, Henry II, duke of Bavaria. In Italy he suppressed a rising under Crescentius, and then attempted to drive the Greeks from Lower Italy; but they called in the aid of the Saracens from Sicily (981), and Otho suffered a total defeat (982). He escaped by leaping into the sea, was picked up by a Greek ship, from which he afterwards escaped by a ruse, and died soon after at Rome.

Otho III, son of the preceding, and the last of the male branch of the Saxon imperial house, was born in 980; died in 1002.

Otho I, King of Greece, second son of Louis of Bavaria, born in 1815; died in 1867. In 1832 he was elected King of Greece; but his Germanic tendencies caused continual friction, which ended in a rebellion and his abdication (1862). He spent the latter part of his life in Munich.

Otho, Marcus Salvius, a Roman emperor, was born in 32 A.D.; died by his own hand in 69 A.D. He joined Galba when he rebelled against Nero, and on his accession in 67 Otho became his favorite and was made consul; but when Galba appointed Piso as his successor Otho bribed the army, had Galba and Piso murdered, and was proclaimed emperor in 69. He was acknowledged by the eastern provinces, but in Germany Vitellius was proclaimed by his legions. The latter having led his army into Italy, overthrew the forces of Otho at Bebriacum, who killed himself after reigning for three months and a few days.

Otididæ (o-tid'i-dē), a family of carinate birds comprising the bustards.

Otis (ō'tis), Elwell Stephen, was born in Frederick, Maryland, in 1838. He became a captain in the Civil war, serving from September, 1862, and was severely wounded in 1864. After the war he remained in the army as lieutenant-colonel, fought in the Indian wars, and was sent to the Philippines as major-general of volunteers. He was military governor of Manila till May, 1900. He retired in 1902, and died in 1909.

Otis, James, patriot, was born at West Barnstable, Massachusetts, in 1725; was graduated from Harvard 1743; was admitted to the bar and moved to Boston in 1750. In 1760 he inaugurated the American patriotic movement with a famous speech on trade relations. Elected to the legislature in 1762, he became a leader of the popular party and was sent to the 'Stamp Act' Congress, convened at New York in 1765. In print also he defended the cause of the colonies. Severely wounded by royalist ruffians in 1769, he became partly deranged, but lived until 1783.

Otley (ot'li), a town of England, West Riding of Yorkshire, 10 miles north from Bradford. Worsted, spinning and weaving, tanning and currying, etc., are carried on. Pop. 9843.

Otoliths (ō'tu-lethz), small vibrating calcareous bodies contained in the membranous cavities or labyrinths of the ears of some animals, especially of fishes and fish-like amphibia.

Otomis (o-tom'iz), a tribe of Mexican Indians, and one of the oldest in the mountainous region of the plateau. They were agriculturists and had ornaments of gold and copper and some knowledge of cloth-making. They came to the assistance of Cortez when besieging Mexico in 1521. Since then they have been nominally in subjection to the whites, but have made little progress in civilization. Their descendants, scattered through Central Mexico, number about 200,000.

Otranto (ō-trän'tō; ancient, *Hydruntum*), a town of Southern Italy, province of Lecce, or Terra di Otranto, on the strait of same name, 42 miles S. S. E. of Brindisi. It was once an important city, and its favorable position and harbor still secure it a certain amount of trade. The region of Otranto is fertile and thickly populated. Pop. 2295.

Otranto, Duke of. See *Fouché.*

Ottar of Roses. See *Attar.*

Ottava Rima (o-tä'va rē'ma; Italian, *octuple rhyme*), a form of versification consisting of stanzas of two alternate triplets, and concluding with a couplet. It seems to have been a favorite form with Italian poets even before the time of Boccaccio. The regular ottava rima is composed of eight eleven-syllable lines with dissyllabic rhyme.

Ottawa (ot'tä-wä), a river in the Dominion of Canada, forming for a considerable part of its length the boundary between the provinces of Quebec and Ontario. It rises in the high land which separates the basin of Hudson Bay from that of the St. Lawrence, about lat. 48° 30′ N., and after a course of some 750 miles discharges into the St. Lawrence above the island of Montreal. Six miles above the city of Ottawa rapids begin which terminate in the Chaudiére Falls, where the river, here 200 feet wide, takes a leap of 40 feet. Its banks, mostly elevated, offer magnificent scenery. Immense quantities of valuable timber are floated down the Ottawa from the wooded regions of the interior to Ottawa city, where it is manufactured into lumber.

Ottawa, a city in the province of Ontario, capital of the Dominion of Canada, on the right bank of the Ottawa, about 90 miles above its confluence with St. Lawrence, 100 miles west of Montreal, and on the Canadian Pacific Railway. The city, divided into the Upper and Lower town by the Rideau Canal, has wide streets crossing at right angles, and some of the finest buildings in the Dominion. The chief are the government buildings constructed of light-colored sandstone in the Italian-Gothic style. They stand on elevated ground commanding a fine view, and form three sides of a quadrangle, the south front being formed by the Houses of Parliament building, which is 500 feet long, and containing the halls for the meetings of the Dominion Senate and House of Commons. There is a library forming a detached circular building with a dome 90 feet high. The buildings cover about 4 acres, and are said to have cost $4,000,000. The educational institutions include a Roman Catholic College, the Canadian Institute, the Mechanics' Institute and Athenæum, etc. Ottawa has important and increasing manufactures, and is the great center of the lumber trade. It is connected with Hull, on the Quebec side of the Ottawa, by a suspension bridge. Ottawa was founded in 1827 by Colonel By, and until 1854 was known as Bytown. On April 26, 1900, it with Hull suffered from a fire, resembling in destruction those of Chicago and Boston. Pop. (1911) 87,062.

Ottawa, a city of Illinois, capital of Lasalle County, on the Illinois River, 83 miles W. S. W. of Chicago. Here are St. Francis Xavier's and Pleasant View Luther colleges. It has an active trade in grain and other products, and large glass works, silver plate works and other industries. The United States Silica Company digs, refines and ships sand in very large quantities, and there are coal mines, marble quarries and mineral springs in the vicinity. Pop. 9535.

Ottawa, a city of Kansas, capital of Franklin Co., on the Osage River, 27 miles S. of Lawrence. There are large railroad shops, and manufactures of flour, sorghum, iron, soap, etc. Pop. 7650.

Otter (ot'er), a carnivorous mammal, family Mustelidæ or weasels, genus *Lutra*. There are several species, differing chiefly in size and fur. They all have large flattish heads, short ears, webbed toes, crooked nails, and tails slightly flattened horizontally. The common river-otter, the *Lutra vulgāris* of Europe, inhabits the banks of rivers, feeds principally on fish, and is often

Otter (*Lutra vulgāris*).

very destructive, particularly to salmon. The under fur is short and woolly, the outer is composed of longer and coarser hairs of dark-brown hue. They burrow near the water's edge, line their nest with grass and leaves, and produce from four to five young. The weight of a full-grown male is from 20 to 24 lbs.; length from nose to tail 2 feet; tail 15 to 16 inches. A species of otter (*Lutra nair*) is tamed in India by fishermen, and used for hunting fish; and in Europe tame otters have occasionally been kept for a similar purpose. The American or Canadian otter (*Lutra Canadensis*) averages about 4 feet in length inclusive of the tail. It is plentiful in Canada, and furnishes a valuable fur, which is a deep reddish-brown in winter, and blackish in summer. The sea-otters (*Enhydra*), represented typically by the great sea-otter

THE CANADIAN HOUSES OF PARLIAMENT, AT OTTAWA

(*E. marīna*), inhabit the coasts of the North Pacific Ocean, but are of comparatively rare occurrence. The tail is short, measuring about 7 inches only; weight 60 to 70 lbs. The fur is soft, and of a deep lustrous black, or of a dark maroon color when dressed, and much prized. In general appearance the sea-otter somewhat resembles a small seal.

Otto, German sovereign. See *Otho.*

Ottoman Empire (o t′ u - m an), or the e m p i r e of Turkey, the territories in Europe, Asia and Africa more or less under the sway of the Turkish sultan. In Europe, it formerly covered a large area, but has been reduced as a result of wars to the southern part of the Balkan peninsula north of Greece. In Asia it includes Asia Minor, Syria (with Palestine), Mesopotamia, part of Arabia, Candia, and others of the islands of the Archipelago; in Africa, Egypt, over which there is a nominal suzerainty, and the vilayet of Tripoli. Formerly the empire was much more extensive, even in recent times comprising Greece, Bulgaria, Roumania, Servia, Bessarabia, Tunis, etc. We shall here give a brief sketch of the history of the Ottoman Empire, referring to the article *Turkey* for information regarding the geography, constitution, etc., of Turkey proper.

The Ottoman Turks came originally from the region of the Altai Mountains, in Central Asia, and in the sixth century A.D. pushed onward to the west in connection with other Turkish tribes. Early in the eighth century they came in contact with the Saracens, from whom they took their religion, and of whom they were first the slaves and mercenaries, and finally the successors in the caliphate. In the thirteenth century they appeared as allies of the Seljukian Turks against the Mongols, and for their aid received a grant of lands from the Seljuk sultan of Iconium in Asia Minor. Their leader, Othman or Osman, of the race of Oghuzian Turkomans, became the most powerful emir of Western Asia, and after the death of the Seljuk sultan of Iconium in the year 1300 he proclaimed himself sultan. He died in 1326. Thus was founded upon the ruins of the Saracen, Seljuk and Mongol power the Empire of the Osman or Ottoman Turks in Asia; and after Osman, the courage, policy and enterprise of eight great princes, whom the dignity of caliph placed in possession of the standard of the Prophet, and who were animated by religious fanaticism and a passion for military glory, raised this powerful empire to the rank of the first military power in both Europe and Asia (1300-1566).

The first after Osman was his son Orkham. He subdued all Asia Minor to the Hellespont, took the title of *Padishah*, and became son-in-law to the Greek Emperor Cantacuzenus. Orkhan's son, Soliman, first invaded Europe in 1355. He fortified Gallipoli and Sestos, and thereby held possession of the straits which separate the two continents. In 1360 Orkhan's second son and successor, Amurath I, took Adrianople, which became the seat of the empire in Europe, conquered Macedonia, Albania and Servia, and defeated a great Slav confederation under the Bosnian King Stephen at Kossova in 1389. After him Bajazet, surnamed Ilderim (*Lightning*), invaded Thessaly, and also advanced towards Constantinople. In 1396 he defeated the Western Christians under Sigismund, King of Hungary, at Nicopolis, in Bulgaria; but at Angora in 1402 he was himself conquered and taken prisoner by Timour, who divided the provinces between the sons of Bajazet. Finally, in 1413 the fourth son of Bajazet, Mohammed I, seated himself upon the undivided throne of Osman. In 1415 his victorious troops reached Salzburg and invaded Bavaria. He conquered the Venetians at Thessalonica in 1420; and his celebrated grand-vizier Ibrahim created a Turkish navy. Mohammed was succeeded by his son, Amurath II, who defeated Ladislaus, King of Hungary and Poland, at Varna in 1444. Mohammed II, the son of Amurath, completed the work of conquest (1451-81). He attacked Constantinople, which was taken May 29, 1453, and the Byzantine Empire came finally to an end. Since that time the city has been the seat of the Sublime Porte or Turkish government. Mohammed added Servia, Bosnia, Albania and Greece to the Ottoman Empire, and threatened Italy, which, however, was freed from danger by his death at Otranto in 1480. His grandson, Selim I, who had dethroned and murdered his father in 1517, conquered Egypt and Syria. Under Soliman II, *the Magnificent*, who reigned between 1519 and 1566, the Ottoman Empire reached the highest pitch of power and splendor. In 1522 he took Rhodes from the Knights of St. John, and by the victory of Mohacz, in 1526, subdued half of Hungary. He exacted a tribute from Moldavia, made Bagdad, Mesopotamia and Georgia subject to him, and threatened to overrun Germany, but was checked before the walls of Vienna (1529). Soliman had as an opponent Charles V of Germany; as an ally Francis II of France. From his

time the race of Osman degenerated and the power of the Porte declined.

In the latter part of the sixteenth century, and most of the seventeenth century, the chief wars were with Venice and with Austria. The battle of Lepanto (1571), in which the Ottoman fleet was overthrown by the combined fleets of Venice and Spain, was the first great Ottoman reverse at sea; and the battle of St. Gothard (1664), near Vienna, in which Montecuculi defeated the Vizier Kiuprili, the first great Ottoman reverse on land. In 1683 Vienna was besieged by the Turks, but was relieved by John Sobieski and Charles of Lorraine; in 1687 the Turks were again defeated at Mohacz, and in 1697 (by Prince Eugene) at Szenta. Then followed the Treaty of Carlowitz in 1699, by which Mustapha II agreed to renounce his claims upon Transylvania and a large part of Hungary, to give up the Morea to the Venetians, to restore Podolia and the Ukraine to Poland, and to leave Azov to the Russians. Eugene's subsequent victories at Peterwardein and Belgrade obliged the Porte to give up, by the Treaty of Passarowitz in 1718, Temeswar, Belgrade, with a part of Servia and Walachia; but the Turks on the other hand took the Morea from Venice, and by the Treaty of Belgrade in 1739 regained Belgrade, Servia and Little Walachia, while for a time they also regained Azov.

Russia, which had been making steady advances under Peter the Great and subsequently, now became the great opponent of Turkey. In the middle of the eighteenth century the Ottoman Empire still embraced a large part of Southern Russia. The victories of Catharine II's general Romanzoff in the war between 1768 and 1774 determined the political superiority of Russia, and at the Peace of Kutchuk-Kainargi, in 1774, Abdul-Hamid was obliged to renounce his sovereignty over the Crimea, to yield to Russia the country between the Bog and the Dnieper, with Kinburn and Azov, and to open his seas to the Russian merchant ships. By the Peace of Jassy, 1792, which closed the war of 1787-91, Russia retained Taurida and the country between the Bog and the Dniester, together with Otchakov, and gained some accessions in the Caucasus. In the long series of wars which followed the French revolution the Ottoman Empire first found herself opposed to France, in consequence of Bonaparte's campaign in Egypt, and finally to Russia, who demanded a more distinct recognition of her protectorate over the Christians, and to whom, by the Peace of Bucharest, May 28, 1812, she ceded that part of Moldavia and Bessarabia which lies beyond the Pruth. In 1817 Mahmud II was obliged to give up the principal mouth of the Danube to Russia. Further disputes ended in the Porte making other concessions, which tended towards loosening the connection of Servia, Moldavia and Walachia with Turkey. In 1821 broke out the war of Greek independence. The remonstrances of Britain, France and Russia against the cruelties with which the war against the Greeks was carried on proving of no avail, those powers attacked and destroyed the fleet of Mahmud at Navarino (1827). In 1826 the massacre of the Janizaries took place at Constantinople, after a revolt. In 1828-29 the Russians crossed the Balkans and took Adrianople, the war being terminated by the Peace of Adrianople (1829). In that year Turkey had to recognize the independence of Greece. In 1831-33 Mehemet Ali, nominally Pasha of Egypt, but real ruler both of that and Syria, levied war against his sovereign in 1833, and threatened Constantinople; when the Russians, who had been called on for their aid by the sultan, forced the invaders to desist. In 1840 Mehemet Ali again rose against his sovereign; but through the active intervention of Great Britain, Austria and Russia was compelled to evacuate Syria, though he was, in recompense, recognized as hereditary viceroy of Egypt.

The next important event in the history of the Ottoman Empire was the war with Russia in which Turkey became involved in 1853, and in which she was joined by England and France in the following year. This war, known as the Crimean war (which see), terminated with the defeat of Russia, and the conclusion of a treaty at Paris on March 30, 1856, by which the influence of Russia in Turkey was greatly reduced. The principal articles were the abolition of the Russian protectorate over the Danubian principalities (Moldavia and Walachia, united in 1861 as the principality of Roumania), the rectification of the frontier between Russia and Turkey, and the cession of part of Bessarabia to the latter power.

In 1875 the people of Herzegovina, unable to endure any longer the misgovernment of the Turks, broke into rebellion. A year later the Servians and Montenegrins likewise took up arms, and though the former were unsuccessful and obliged to abandon the war, the Montenegrins still held out. Meantime the great powers of Europe were pressing reforms on Turkey, and at the end of 1876 a conference met at Constantinople with

the view of making a fresh settlement of the relations between her and her Christian provinces. All the recommendations of the conference were, however, rejected by Turkey; and in April following, Russia, which had been coming more and more prominently forward as the champion of the oppressed provinces and had for months been massing troops on both the Asiatic and the European frontier of Turkey, issued a warlike manifesto and commenced hostile operations in both parts of the Turkish Empire. It was immediately joined by Roumania, who on the 22d of May (1877) declared its independence. The progress of the Russians was at first rapid; but the Turks offered an obstinate resistance. After the fall of Kars, however, November 18, and the fall of Plevna, December 10, the Turkish resistance completely collapsed, and on March 3, 1878, Turkey was compelled to agree to the Treaty of San Stefano, in which she accepted the terms of Russia. The provisions of this treaty were, however, considerably modified by the Treaty of Berlin concluded on July 13th following, by which Roumania, Servia and Montenegro were declared independent; Roumanian Bessarabia was ceded to Russia; Austria was empowered to occupy Bosnia and Herzegovina; and Bulgaria was erected into a principality. It became an independent monarchy in 1908, and in the same year Bosnia and Herzegovina were annexed to the Austrian Empire. (See *Berlin, Treaty of.*)

The main events in the history of the Ottoman Empire since the conclusion of the Treaty of Berlin are the French invasion of Tunis in 1881, which soon after was formally placed under the protectorate of the French; the treaty with Greece, executed under pressure of the Great Powers in 1881, by which Turkey ceded to Greece almost the whole of Thessaly and a strip of Epirus; the occupation of Egypt by Great Britain in 1882; and the revolution at Philippopolis in 1885, when the government of Eastern Roumelia was overthrown, and the union of that province with Bulgaria proclaimed. A constitution granted in 1876 was quickly revoked by the reigning sultan, Abdul Hamid II, who reigned as an autocrat until 1908, when he was obliged to yield to the demands of the Young Turk reform party and restore the constitution and legislature. In April, 1909, a reactionary military outbreak, supposed to be fomented by the sultan, led to the capture of the city by a revolutionary army and his deposition. On April 27, his brother, Mohammed Rechad, succeeded as Mohammed V. In the autumn of 1911 Italy invaded the Turkish province of Tripoli, in North Africa, and by the close of the year had taken all the coast cities, though the Arabs and Turks in the hinterland kept up a sturdy resistance.

Ottumwa (ot-tum′wȧ), a city of Iowa, capital of Wapello County, on the Des Moines River, 75 miles northwest of Burlington. It is in the heart of the great coal-field of Iowa and in one of its richest agricultural regions. There is a large pork-packing business, and extensive iron, boiler and stove works, also manufactures of agricultural implements, cutlery, drills, etc. Pop. 22,012.

Otway (ot′wā), THOMAS, an English dramatist, was born in 1651; educated at Winchester and Oxford, and produced his first tragedy in 1675. As a tragic writer he excelled in pathos, his fame chiefly resting upon his *Orphan* and *Venice Preserved.* The latter is still occasionally played. He died in 1685.

Oubliette (ö′bli-et), a dungeon existing in some old castles and other buildings, with an opening only at the top for the admission of air. It was used for persons condemned to perpetual imprisonment or to perish secretly.

Oudenarde (ö-dn-ärd), a town of Belgium, province of East Flanders, on the Scheldt, 15 miles south of Ghent. It has sustained several sieges, but is best known in history by the memorable victory gained over the French on July 11, 1708, by Prince Eugene and the Duke of Marlborough. Pop. 6572.

Oudh, or OUDE (oud), a province of British India, bounded on the north by Nepaul, and on other sides by the Northwest Provinces; area, 24,217 square miles. Oudh is a vast alluvial plain, watered by the Gogra, Gumti, Kapti and Ganges. It is for the most part highly fertile, and wheat, barley, rice, sugar, indigo, and others of the richest products of India are raised in large quantities. Oudh, formerly a Mogul province (subsequently kingdom, 1819), became subordinate to the British after the battle of Kalpe, in 1765. In 1856 complaints of the misgovernment of the king of Oudh led to the annexation of the country to the British dominions, an annual pension of £120,000 being settled on the king. This measure, however, produced much dissatisfaction, and when, in 1857, the mutiny broke out, most of the Oudh sepoys joined it, and the siege of Lucknow resulted. (See *Indian Mutiny.*) Since the pacification of 1858, schools and courts of justice have been

established, and railways have been opened. Lucknow is the capital, and the main center of population and manufactures. Pop. 12,833,077 (mostly Hindus), giving the large average of 522 to the square mile.

Oudh (formerly Ayodhya), an ancient town in Faizabad District, Oudh, of which province it was anciently the capital. In remote antiquity it was one of the largest and most magnificent of Indian cities, and is famous as the early home of Buddhism and of its modern representative, Jainism. It is now a suburb of Faizabad, or Fyzabad (which see).

Oudinot (ö-di-nō), CHARLES NICOLAS, Duke of Reggio, peer and marshal of France, born in 1767. In 1791 he was elected commandant of a volunteer battalion, and gave many striking proofs of valor, which gained him speedy promotion. In 1792 he was colonel of the regiment of Picardy, in 1793 brigadier-general, and in 1799 general of division. Masséna made him chief of the general staff, and under his command he decided the battle of the Mincio. In 1804 Napoleon gave him the command of a grenadier corps of 10,000 men, which was to form the advance guard of the main army. At the head of these troops he performed many exploits, winning the battle especially of Ostrolenka, and deciding the fate of three great battles—Austerlitz, Friedland and Wagram. After the last named battle Napoleon made him a marshal and Duke of Reggio, and gave him an estate worth $20,000 a year. He rendered valuable service and was severely wounded in the Russian campaign of 1812. In the campaign of 1813 he was defeated at Grossbeeren and Dennewitz. In the campaign of 1814 he took an active part and was wounded for the twenty-third time. After Napoleon's abdication he gave in his adhesion to the Bourbons, to whom he ever afterwards remained faithful, and who heaped upon him every honor. He died in 1847.—His eldest son, NICOLAS CHARLES VICTOR (born in 1791), commanded the troops which effected the capture of Rome from Garibaldi in 1849. He died in 1863.

Ouida (wē'da). See *Ramée, Louisa de la.*

Ouless (ou'les), WALTER WILLIAM, an English painter, born at St. Helier's, Jersey, in 1848. He studied at the Royal Academy, and began as a painter of *genre*, but has distinguished himself chiefly in portraiture. He was elected R.A. in 1881. Darwin, Newman, Lord Selborne, Sir Fred Roberts, Cardinal Manning, Samuel Morley, and other celebrities have been among his sitters.

Ounce (ouns; Latin, *uncia*, a twelfth part of any magnitude), in Troy weight, is the twelfth part of a pound, and weighs 480 grains; in avoirdupois weight is the sixteenth part of a pound, and weighs 437½ grains Troy.

Ounce (*Felis Uncia*), one of the digitigrade carnivora, found in Northern Africa, Arabia, Persia, India and China. The length of the body is about 3½ feet, the tail measuring about 2 feet. It is a large cat, resembling the leopard and panther, but with a longer and more hairy tail and a thicker fur, somewhat less in size, and not so fierce and dangerous. In some places it is trained to hunt, like the cheetah.

Ourebi (ou're-bi), *Scopophŏrus ourebi*, an antelope of South Africa, found in great numbers in the open plains, and much hunted for its flesh. It is from 2 to 3 feet high, of a pale dun color, and the male has sharp, strong and deeply-ringed horns.

Ouro-Preto (ō'rụ prā'tụ), a town of Brazil, capital of the province of Minas-Geraes, 190 miles N. N. W. of Rio de Janeiro. It was formerly one of the great mining centers of Brazil, but its gold mines are now nearly exhausted. Pop. about 13,000.

Ouse (öz), a river of Yorkshire, formed by the junction of the Swale with the Ure near Boroughbridge; it flows tortuously southeast past York, Selby and Goole, 8 miles east of which it unites with the Trent to form the estuary of the Humber. Its total course is 60 miles, for the last 45 of which (or to York) it is navigable.

Ouse (öz), GREAT, a river of England, rises near Brackley in the county of Northampton, flows in a general northeasterly direction, traverses the counties of Buckingham, Bedford, Huntingdon, Cambridge and Norfolk, and falls into the Wash at King's Lynn, after a course of about 160 miles, two-thirds of it being navigable.

Ousel. See *Ouzel.*

Ouseley (ouz'lē), SIR FREDERICK ARTHUR GORE, BART.; English composer, born in 1825; only son of Sir Gore Ouseley, at one time British ambassador to Persia and Russia. He succeeded his father in the baronetcy in 1844, and subsequently took orders. He exhibited from childhood high musical ability, took the degree of Bachelor of Music at Oxford in 1850, and of Doctor in 1855, and the same year was appointed precentor of Hereford Cathedral. His works include treatises on *Harmony*, on *Counterpoint and Fugue*, and on *Mu-*

sical Form and general composition, and he wrote much church music. He died in 1889.

Outcrop (out'krop), in geology, the exposure of an inclined stratum at the surface of the ground.

Outlawry (out'lą-ri), the putting one out of the protection of the law, a process resorted to against an absconding defendant in a civil or criminal proceeding. It involved the deprivation of all civil rights, and a forfeiture of goods and chattels to the crown. Outlawry in civil proceeding was formally abolished in England in 1879. In Scotland outlawry is a sentence pronounced in the supreme criminal court, where one accused of a crime does not appear to answer the charge. The effect is that he is deprived of all personal privilege or benefit by law, and his movable property is forfeited to the crown. In the United States the practice is unknown.

Outram (ou'tram), Sir James, diplomat and soldier, was born at Butterley Hall, Derbyshire, in 1803. He was brought up in Scotland, studied at Marischal College, Aberdeen, and in 1819 went out as a cadet to India. In 1828 he was selected to undertake a mission to the wild hill tribes of the Bombay presidency, a task in which he acquitted himself with credit. As adjutant to Lord Keane he took part in the Afghan war of 1839, and distinguished himself at the capture of Khelat, and by his dangerous ride disguised as a native devotee through the enemy's country to Kurrachee (1840). After the capture of Ghuznee, he performed the duties of British resident at Hyderabad, Sattara and Lucknow. In 1842 he was appointed commissioner to negotiate with the Ameers of Sind, in which position he adopted views at variance with the aggressive policy of General Sir Charles James Napier. In 1856 he was nominated chief commissioner of Oudh. He was commander-in-chief of the British forces in the Persian war of 1856-57, and from Persia was summoned to India to aid in suppressing the mutiny. Although of higher rank than Havelock, whom he joined with reinforcements at Cawnpore in September, 1857, he fought under him until Lucknow was relieved by Sir Colin Campbell. In the following March he commanded the first division of infantry when Sir Colin finally regained possession of Lucknow. His services were rewarded with a baronetcy, the rank of lieutenant-general, the order of the grand-cross of the Bath, and the thanks of parliament; and statues were erected in his honor in London and Calcutta. The shattered state of his health compelled him to return to England in 1860. He died at Pau in 1863, and was buried in Westminster Abbey.

Outrigger (out'rig-ėr), an iron bracket fixed on the side of a boat, with a rowlock at its extremity, so as to give an increased leverage to the oar without widening the boat; hence, a light boat for river matches provided with such apparatus. The name is also applied to a contrivance in certain foreign boats and canoes, consisting of a projecting framework or arrangement of timbers for counterbalancing the heeling-over effect of the sails, which are large in proportion to the breadth of the vessel.

Outworks (out'wurkz), all works of a fortress which are situated without the principal line of fortification, for the purpose of covering the place and keeping the besiegers at a distance.

Ouvirandra (ö-vi-ran'dra), a genus of plants. See *Lattice-leaf.*

Ouzel (ou'zl), a genus of insessorial or perching birds, included in the family of the thrushes. The common or ring ouzel (*Turdus torquātus*) is a summer visitant of Britain, and its specific name is derived from the presence of a broad semilunar patch or stripe of white extending across its breast. The water ouzel (*Cinclus aquaticus*) belongs to a different family. (See *Dipper.*) Ouzel is also an old or poetical name for the blackbird.

Oval (ō'val), an egg-shaped curve or curve resembling the longitudinal section of an egg. The oval has a general resemblance to the ellipse, but, unlike the latter, it is not symmetrical, being broader at one end than at the other. See *Ellipse*

Ovampos (ō-vam'pos), a collection of black tribes of Southwest Africa, occupying the exceedingly fertile country which lies south of the Cunene River, between 14° and 18° E. longitude, and north of Damara-land. These black tribes resemble the Kaffirs and Damaras in feature, and by many are supposed to be a connecting link between Negroes and Kaffirs. Cattle forms the wealth of the Ovampo tribes, each of which has its own hereditary chief. They are also good agriculturists, and have made considerable progress in various arts.

Ovar (ō-vär'), a town of Portugal, district of Beira, near the Atlantic, on the north shore of the Bay of Aveiro, 22 miles south of Oporto. It is in a low-lying and unhealthy region, but has valua-

ble fisheries and considerable trade in timber. Pop. 10,462.

Ovarian Tumor (ō-vā′ri-an), a morbid growth in the ovary of a woman, sometimes weighing as much as 30, 50, or upwards of 100 lbs., or more, consisting of a cyst containing a thin or thick ropy fluid, causing the disease known as *ovarian dropsy*, which is now generally cured by the operation of ovariotomy.

Ovariotomy (ō-vā-ri-ot′ō-mi), the operation of removing the ovary, or a tumor in the ovary (see above); a surgical operation first performed in 1809, and long considered exceedingly dangerous, but latterly performed with great and increasing success, especially since the adoption of the antiseptic treatment inaugurated by Lister.

Ovary (ō′va-ri), or Ovarium, the essential part of the female generative apparatus, in which the ova or eggs are formed and developed. The ovary in the female corresponds to the *testis* of the male. In adult women the ovaries exist as two bodies of somewhat oval shape, and compressed from side to side, of whitish color and uneven surface. They are situated one on each side of the womb, and are attached to the hinder portion of the body of the womb by two thin cord-like bands—the *ovarian ligaments*, and by a lesser fibrous cord to the fringed edge of the fallopian tube. Each ovary is about 1½ inchs in length, and about 1½ drachms in weight, and contains a number of vesicles known as ovisacs or Graafian follicles, in which the ova are developed. The functions of the ovary, which are only assumed and become active on the approach of puberty, are the formation of ova, their maturation, and their final discharge at periodic menstrual epochs into the uterus or womb. There the ovum may be impregnated and detained, or pass from the body with the menstrual flow. The ovaries are subject to diseased conditions, chief among which are cancer and the occurrence of tumors and cysts. See *Ovarian Tumor*, *Ovariotomy*.

O′vary, in botany, is a hollow case enclosing ovules or young seeds, containing one or more cells, and ultimately becoming the fruit. Together with the style and stigma it constitutes the female system of the vegetable kingdom. When united to the calyx it is called inferior: when separated, superior.

Ovation. See *Triumph*.

Oven (uv′n), a close chamber of any description in which a considerable degree of heat may be generated, used for baking, heating, or drying any substance. In English the term is usually restricted to a close chamber for baking bread and other food substances, but ovens are also used for coking coal, in the arts of metallurgy, in glass making, pottery, etc. There is now a great diversity in the shape and materials of construction, and modes of heating ovens.

Oven Birds, birds belonging to the family Certhidæ or Creepers, found in South America; typical genus, *Furnarius*. They are all of small size, and feed upon seeds, fruits and insects. Their popular name is derived from the form of their nest, which is dome-shaped, and built of tough clay or mud with a winding entrance.

Ovens River, a river in the northeast of the Australian colony of Victoria, a tributary of the Murray. The district is an important gold mining and agricultural one.

Over (ō′vėr), an ancient town of Cheshire, 4 miles W. of Middlewich, has boat building and manufactures of salt. Pop. (1911) 13,778.

Overbeck (ōv′er-bek), Friedrich, a German painter, born at Lübeck in 1789; died in 1869. He commenced his artistic studies in Vienna in 1806, and in 1810 went to Rome, where he, with Cornelius, Schadow, Veit and Schnorr, founded a new school of art, which subordinated beauty to piety, and attempted to revive the devotional art of the pre-Raphaelite period. In 1814, in company with several of his artistic brethren, he abjured Lutheranism, embraced the Roman Catholic faith, and made Rome almost exclusively the place of his abode. Among his chief works are: *The Entrance of Christ into Jerusalem; Christ on the Mount of Olives; The Entombment; The Triumph of Religion; The Vision of St. Francis;* two series of frescoes, one on the *History of Joseph* for the Casa Bartholdi, and one on Tasso's *Gerusalemme Liberata* for the Villa Massimi at Rome, etc.

Overbury (ō′ver-be-ri), Sir Thomas, known as a miscellaneous writer, but more especially for his tragical death at the instance of the Earl of Rochester and the Countess of Essex, was born in Warwickshire in 1581, and studied at Oxford. He contracted an intimacy with Rochester, then Robert Carr, at the court of James I, and provoked the anger of the countess by endeavoring to dissuade his friend from marrying her. Rochester procured the imprisonment of his late friend in the Tower of London, by creating a cause of offense between him and the king,

and, some months later, caused him to be poisoned there, September 15, 1613. Though suspicions were entertained at the time, it was not till 1616 that this deed of darkness was discovered, when the inferior agents were all apprehended, tried, and executed. Rochester, now earl of Somerset, and the countess were also tried and condemned, but they were both pardoned by the king for private reasons. Overbury's *Characters*, and *The Wife*, a didactic poem, published in 1614, have still a reputation.

Over Darwen. See *Darwen.*

Overijssel (ō-vèr-īs′sėl), or Overyssel, a province of the Netherlands; area, 1283 square miles. It is watered by the Ijssel, which separates it from Gelderland, and by the Vecht and its affluents. Except a strip along the Ijssel, presenting good arable and meadow land, the surface is mostly a sandy flat relieved by hillocks, and the principal industry is stock raising, and dairy farming. Chief towns, Zwolle, Deventer, Almelo and Kampen. Pop. 359,443.

Overshot Wheel (ō′v e r - s h o t), a wheel driven by water shot over from the top. The buckets of the wheel receive the water as nearly as possible at the top, and retain it until they approach the lowest point

Overshot Water-wheel.

of the descent. The water acts principally by its gravity, though some effect is of course due to the velocity with which it arrives.

Overture (ō′ver-tūr), in music, an introductory symphony, chiefly used to precede great musical compositions, as oratorios and operas, and intended to prepare the hearer for the following compositions, properly by concentrating its chief musical ideas so as to give a sort of outline of it in instrumental music. This mode of composing overtures was first conceived by the French. Overtures are, however, frequently written as independent pieces for the concert room.

Ovibos. See *Musk-ox.*

Ovid (ov′id), in full, Publius Ovidius Naso, a celebrated Roman poet, born in 43 B.C. He enjoyed a careful education, which was completed at Athens, where he gained a thorough knowledge of the Greek language. He afterwards traveled in Asia and Sicily. He never entered the senate, although by birth entitled to that dignity, but filled one or two unimportant public offices. Till his fiftieth year he continued to reside at Rome, enjoying the friendship of a large circle of distinguished men. By an edict of Augustus, however (A.D. 8), he was commanded to leave Rome for Tomi, a town on the inhospitable shores of the Black Sea, near the mouths of the Danube. It is impossible now to come to any certain conclusion as to the cause of this banishment, that given in the edict—the publication of the *Art of Love*—being merely a pretext, the poem having been in circulation ten years previously. The real cause may have been his intrigue with Julia, the clever but dissolute daughter of Augustus, whom he is supposed to have celebrated under the name of Corinna; or it may have been his complicity in the intrigue of Julia, the granddaughter of Augustus, with Silanus. The change from the luxurious life of a Roman gallant to that of an exile among barbarians whose very language was unknown to him must have been far from agreeable, and we find him addressin humble entreaties to the imperial court to shorten the term or change the place of banishment; but these entreaties, backed up by those of his friends in Rome, were of no avail; and Ovid died at Tomi in the year 18 A.D. He had been three times married. His works include *Amorum Libri III*, love elegies; *Epistolæ Heroïdum*, letters of heroines to their lovers or husbands; *Ars Amatoria*, ('Art of Love'); *Remedia Amoris*, ('Love Remedies'); the *Metamorphoses*, in fifteen books; *Fasti*, a sort of poetical calendar; *Tristia; Epistolæ ex Ponto*, ('Epistles from Pontus'), etc.

Oviduct (ov′i-dukt), the name given to the canal by which, in animals, the ova or eggs are conveyed from the ovary to the uterus or into the external world. In mammals the oviducts are termed *Fallopian tubes*, being so named after the anatomist who first described them.

Oviedo (ō-vi-ā′dō), a town of Spain, capital of a province of same

name, 230 miles northwest of Madrid. It was founded in 762, has a fourteenth century cathedral and a university, and manufactures of hats, arms, napery, etc. Pop. 48.103.—The province, area 4080 square miles, pop. 627,069, is situated on the Bay of Biscay, and bounded by the provinces of Santander, Leon and Lugo. It has a wild and stormy coast, and a mountainous interior better adapted for pasture than agriculture.

Oviedo y Valdez (ō-vi-ā′*dō* ē vål-deth′), GONZALO FERNANDEZ DE, a Spanish historian, born in 1478, and brought up as a page at the court of Ferdinand and Isabella. In 1514 he received a government appointment in the newly-discovered island of Hispaniola, and with few intervals spent the rest of his life there. Named by Charles V historiographer of the Indies, he wrote his *Historia General y Natural de las Indias Occidentales.* This and his *Quinquagenas* are two works of great historical value. He died at Valladolid in 1557.

Oviparous (ō-vip′a-rus), a term applied to those animals which produce ova or eggs from which the young are afterwards hatched. Where the eggs—as in some lizards, some snakes, or as in the land salamanders—are retained within the body of the parent until such time as the young escape from them, the animals are said to be *ovo-viviparous.*

Ovipositor (ō-vi-pos′i-tur), an appendage attached to the abdominal segments of certain insects, and used for placing the eggs in situations favorable to their due development, this being sometimes in bark or leaves, or even in the bodies of other animals. The sting of bees, wasps, etc., is a modification of an ovipositor or analogous structure.

Ovolo (ō′vu-lō), in architecture, a convex moulding, generally a quarter of a circle; but in classic architecture there is usually a departure from the exact circular form to that of an egg; hence the name (L. *ovum,* an egg).

Ovo-viviparous. See *Oviparous.*

Ovule (ō′vūl), in botany, a rudimentary seed which requires to be fertilized by pollen before it develops. It is composed of two sacs, one within another, which are called primine and secundine sacs, and of a nucleus within the sacs. At one point, the *chalaza,* the nucleus, and the two coats come into contact, and here there is a minute orifice called the *foramen* or *micropyle.* See *Botany.*

Ovum (ō′vum), the 'egg' or essential product of the female reproductive system, which, after impregnation by contact with the semen or essential fluid of the male, is capable of developing into a new and independent being. The essential parts to be recognized in the structure of every true ovum or egg consist, firstly, of an outer membrane known as the *vitelline membrane.* Within this is contained the *vitellus* or *yolk,* and imbedded in the yolk-mass the *germinal vesicle* and smaller *germinal spot* are seen. See *Ovary, Reproduction.*

Owatonna (ō-wâ-ton′nâ), a city, capital of Steele County, Minnesota, on Straight River, 37 miles E. by S. of Mankato. It has nurseries, flour mills, and various manufactures and is an important agricultural trade center. Here is a valuable mineral spring. Pop. 5658.

Owego (ō-wē′gō), a town, capital of Tioga County, New York, situated on the Susquehanna River at the mouth of Owego Creek, 37 miles E. of Elmira. It has lumbering interests, and flour, leather, wagon, harness, iron-bridges, and other manufactures. Pop. 4633.

Owen (ō′en), JOHN, English Nonconformist divine, born at Stadham, Oxfordshire, in 1616, studied at Oxford, and on the breaking out of the Civil war took part with the Parliament. He adopted the Independent mode of church government. He was appointed to preach at Whitehall the day after the execution of Charles I; accompanied Cromwell in his expeditions both to Ireland and Scotland; in 1651 was made dean of Christ Church College, Oxford, and in 1652 was nominated by Cromwell, then chancellor of the university, his vice-chancellor, offices of which he was deprived in 1657. He died in 1683. Owen was a man of great learning and piety, of high Calvinistic views, and the author of numerous works.

Owen, SIR RICHARD, comparative anatomist and palæontologist, was born at Lancaster, England, in 1804, and educated in the Lancaster schools and the medical schools of Edinburgh, Paris and London. Having settled in the metropolis, he became assistant curator of the Hunterian Museum. In 1834 he was appointed professor of comparative anatomy at St. Bartholomew's Hospital; in 1836 professor in anatomy and physiology at the Royal College of Surgeons, and in 1856 superintendent of the natural history department in the British Museum, from which last post he retired in 1883. Owen was regarded as having been the greatest

palæontologist after Cuvier, and as a comparative anatomist a worthy successor to Hunter. He was a voluminous writer on his special subjects, and an honorary fellow of nearly every learned society of Europe and America. Among his works are *Lectures on the Comparative Anatomy of the Invertebrate Animals; Lectures on the Comparative Anatomy of the Vertebrate Animals; History of British Fossil Mammals and Birds; History of British Fossil Reptiles; Principles of Comparative Osteology; On the Anatomy of Vertebrates; The Fossil Reptiles of South Africa; The Fossil Mammals of Australia*, etc. He died in 1892.

Sir Richard Owen.

Owen, Robert, philanthropist and social theorist, born at Newtown, Montgomeryshire, North Wales, in 1771; died there in 1858. Early distinguished by his business talents, at the age of eighteen he became manager of a spinning mill at Chorlton, near Manchester, and subsequently of the New Lanark cotton mills, belonging to Mr. Dale, a wealthy Glasgow manufacturer, whose daughter he married. Here Owen introduced many important reforms, having for their object the improvement of the condition of the laborers in his employ. In 1812 he published *New Views of Society, or Essays upon the Formation of Human Character;* and subsequently a *Book of the New Moral World*, in which he completely developed his socialistic views, insisting upon an absolute equality among men. He had three opportunities of setting up social communities on his own plan—one at New Harmony in America, another at Orbiston in Lanarkshire, and the last in 1844, at Harmony Hall in Hampshire, all of which proved signal failures. In his later years Mr. Owen became a firm believer in Spiritualism. His eldest son, Robert Dale Owen (1801-77), for a time resident minister of the United States at Naples, is chiefly known as an exponent of spiritualism, on which subject he wrote several works. Another son, David Dale Owen (1807-60), acquired reputation as a geologist.

Owensborough (ō′ens-bur-ō), a city, the capital of Daviess County, Kentucky, on the Ohio River, 160 miles from Louisville, is extensively engaged in the curing of tobacco and the manufacture of whisky. Coal and iron are mined and there are various other industries. Pop. 16,011.

Owens College (ō′enz), Manchester, was established under the will of John Owens, a Manchester merchant, who died in 1846, and left about £100,000 for the purpose of founding an institution for providing a university education, in which theological and religious subjects should form no part of the instruction given. Teaching commenced in 1851, and the present handsome Gothic building for the accommodation of the college was completed in 1873. The increasing success of the college led to the establishment of a new university, Victoria University, to consist of Owens College and several towns, but having its headquarters in Manchester. The Victoria University was instituted by royal charter in 1880, with power to grant degrees in arts, science and law, a supplemental charter, granted May, 1883, giving power to grant degrees in medicine. University College, Liverpool, was incorporated with Victoria University in 1884, and the Yorkshire College, Leeds, in 1888. There is a women's department in connection with Owens College, the classes being held in separate buildings. The charter of Victoria University gives power to grant degrees to women, and the examinations are thrown open to them.

Owen Sound, formerly Sydenham, a town and port of entry of Ontario, Canada, on Georgian Bay, 91 miles N. W. of Toronto. The harbor is one of the best on Lake Huron, and there is a good grain and lumber trade, also varied manufactures. The scenery is fine and it is a popular summer resort. Pop. (1911) 12,558.

Owhyhee (ō-wī′hē), the same as Hawaii. See *Sandwich Islands.*

Owlglass, or Howleglass. See *Eulenspiegel.*

Owl-Parrot (*Strigops habroptilus*), the type and only known

representative of a peculiar group of the parrot family, is a large bird, a native of the South Pacific Islands, and especially of New Zealand. In aspect and in nocturnal habits it resembles the owl. It feeds on roots, which it digs out of the earth with its hooked beak. It seldom flies; it is generally to be seen resting in hollow stumps and logs, and is said to hibernate in caves.

Owls (oulz), a group of birds forming a well defined family (Strigidæ), which in itself represents the Nocturnal Section of the order of Raptores or Birds of Prey. The head is large and well covered with feathers, part of which are generally arranged around the eyes in circular discs, and in some species form horn-like tufts on the upper surface of the head. The beak is short, strongly curved and hooked. The ears are generally of large size, prominent, and in many cases provided with a kind of fleshy valve or lid, and their sense of hearing is exceedingly acute. The eyes are very prominent and full, and project forwards, the pupils being especially well developed —a structure enabling the owls to see well at dusk or in the dark. The plumage is of soft downy character, rendering their flight almost noiseless. The tarsi are feathered, generally to the very base of the claws, but some forms, especially those of fish-catching habits, have the toes and even the tarsi bare. The toes are arranged three forwards and one backwards; but the outer toe can be turned

Barn-owl (*Strix flammĕa*).

backwards at will, and the feet thus converted into hand-like or prehensile organs. In habits most species of owls are nocturnal, flying about during the night, and preying upon the smaller quadrupeds, nocturnal insects, and upon the smaller birds. Mice in particular form a large part of their food. During the day they inhabit the crevices of rocks, the nooks and crannies of old or ruined buildings, or the hollows of trees; and in these situations the nests are constructed. They vary greatly in size, the smallest not being larger than a thrush. In their distribution, the owls occur very generally over the habitable globe, both worlds possessing typical representatives of the

Long-eared Owl (*Asio otus*).

group. The common white or barn owl (*Strix flammĕa*) is the owl which has the greatest geographical range, inhabiting almost every country in the world. The genus *Asio* contains the so-called horned owls, distinguished by elongated horn-like tufts of feathers on the head. The long-eared owl (*Asio otus* or *Otus vulgāris*) appears to be common to both Europe and America. It inhabits woods. The short-eared owl (*Asio accipitrīnus* or *Otus brachyōtus*) frequents heaths, moors, and the open country generally to the exclusion of woods. It has an enormous geographical range. The eagle owl (*Bubo ignāvus*) occurs in Norway, Sweden and Lapland, and over the continent of Europe to the Mediterranean. A similar species (*B. Virginiānus*) extends over the whole of North America. Owls of diurnal habits are the hawk owl (*Surnia*) and the snowy owl (*Nyetea*). The hawk owl mostly inhabits the Arctic regions, but migrates southwards in winter, as does the snowy owl, which is remarkable for its large size and snowy plumage. The little owl (*Carine noctua*), the bird of Pallas Athena, is spread throughout the greater part of Europe. One of the most remarkable of owls is the burrowing owl (*Athēna cunicularia*) of the United States and the West Indies, which inhabits the burrows of the marmots (which see), or prairie-dogs.

Owosso (ō-wos′sō), a city of Shiawassee County, Michigan, on Shiawassee River, which affords good water power. It is 28 miles N. E. of Lansing. It is the trade center of a wide farm-

OXFORD

This beautiful English town is the seat of Oxford University, one of the oldest and most famous institutions of learning in the world.

ing region, and has varied manufactures, including a large burial case factory, large binding works, etc. Pop. 9639.

Ox (oks), the general name of certain well-known ruminant quadrupeds, subfamily Bovidæ (Cavicornia). The characters are: the horns are hollow, supported on a bony core, and curved outward in the form of crescents; there are eight incisor teeth in the under jaw, but none in the upper; there are no canines or dog-teeth; the naked muffle is broad. The species are *Bos Taurus*, or common ox; *B. Urus*, aurochs, or bison of Europe; *B. Bison*, or buffalo of North America; *B. Bubalus*, or proper buffalo of the eastern continent; *B. caffer*, or Cape buffalo; *B. grunniens*, or yak of Thibet, etc. (See *Bison*, *Buffalo*, *Yak*, etc.) The common ox is one of the most valuable of our domestic animals. Its flesh is the principal article of animal food; and there is scarcely any part of the animal that is not useful to mankind; the skin, the horns, the bones, the blood, the hair, and the very refuse of all these, have their separate uses. Having been specially domesticated by man from a stock which it is probably impossible to trace, the result has been the formation of very many breeds, races, or permanent varieties, some of which are valued for their flesh and hides, some for the richness and abundance of their milk, while others are in great repute both for beef and milk. The name ox is used also in a more restricted sense to signify the male of the bovine genus (*Bos Taurus*) castrated, and full-grown, or nearly so. The young castrated male is called a *steer*. He is called an *ox-calf* or *bull-calf* until he is a year old, and a *steer* until he is four years old. The same animal not castrated is called a *bull*. Besides the European ox there are several other varieties, as the Indian or zebu, with a hump on its back, the Abyssinian, Madagascar and South African.

Oxalic Acid (oks-al′ik), an acid which occurs, combined sometimes with potassium or sodium, at other times with calcium, in wood-sorrel (*Oxălis Acetosella*) and other plants; and also in the animal body, especially in urine, in urinary deposits, and in calculi. Many processes of oxidation of organic bodies produce this substance. Thus sugar, starch, cellulose, etc., yield oxalic acid when fused with caustic potash, or when treated with strong nitric acid. Saw-dust is very much used for producing the acid. Oxalic acid has the formula $C_2H_2O_4$; it is a solid substance, which crystallizes in four-sided prisms, the sides of which are alternately broad and narrow, and the summits dihedral. They are efflorescent in dry air, but attract a little humidity if it be damp. They are soluble in water, and their acidity is so great that, when dissolved in 3600 times their weight of water, the solution reddens litmus paper, and is perceptibly acid to the taste. Oxalic acid is used chiefly as a discharging agent in certain styles of calico printing, for whitening leather, as in boot-tops, and for removing ink and iron mould from wood and linen. It is a violent poison. *Oxalates* are compounds of oxalic acid with bases; one of them, binoxalate of potash, is well known as salts of sorrel, or salts of lemon.

Oxalidaceæ (oks-al-i-dā′se-ē), a nat. order of polypetalous exogenous plants, of which the genus *Oxălis* or wood-sorrel is the type, comprising herbs, shrubs, and trees, remarkable, some of them, for the quantity of oxalic acid they contain. Some American species have tuberous edible roots. For two species see *Blimbing* and *Carambola*.

Oxaluria (oks-al-ū′ri-a), a morbid condition of the system, in which a prominent symptom is the presence of crystallized oxalate of lime in the urine.

Oxenstjerna (oks-en-shėr′na), Axel, Count, a Swedish statesman, born in 1583, studied theology at Rostock, Wittenberg and Jena; and in 1602, after visiting most of the German courts, returned to Sweden and entered the service of Charles IX. In 1608 he was admitted into the senate; and on the accession of Gustavus Adolphus, in 1611, he was made chancellor. He accompanied Gustavus Adolphus during his campaigns in Germany, taking charge of all diplomatic affairs; and on the fall of his master at Lützen (1632) he was recognized, at a congress assembled at Heilbronn, as the head of the Protestant League. This league was held together and supported solely by his influence and wisdom, and in 1636 he returned to Sweden after an absence of ten years, laid down his extraordinary powers, and took his seat in the senate as chancellor of the kingdom and one of the five guardians of the queen. In 1645 he assisted in the negotiations with Denmark at Bromesbro, and on his return was created count by Queen Christina, whose determination to abdicate the crown he strongly but unsuccessfully opposed. He died in 1654.

Ox-eye. See *Chrysanthemum*.

Oxford (oks′fėrd), a city and county borough in England, capital of

Oxford county, and seat of one of the most celebrated universities in the world, is situated about 50 miles W. N. W. of London, on a gentle acclivity between the Cherwell and the Thames, here called the Isis. Oxford, as a city of towers and spires, of fine collegiate buildings old and new, of gardens, groves and avenues of trees, is unique in England. The oldest building is the castle keep, built in the time of William the Conqueror and still all but entire. Of the numerous churches, the first place is due to the cathedral, begun about 1160, and chiefly in the late Norman style. Of the university buildings the most remarkable are Christ's Church, the largest and grandest of all the colleges, with a fine quadrangle and other buildings, a noble avenue of trees (the Broad Walk), the cathedral serving as its chapel; Magdalen College, considered to be the most beautiful and complete of all; Balliol College, with a modern front (1867-69) and a modern Gothic chapel; Brasenose College; and New College (more than 500 years old), largely consisting of the original buildings, and especially noted for its gardens and cloisters; besides the Sheldonian Theater, a public hall of the university; the new examination schools, new museum, Bodleian Library, Radcliffe Library, and other buildings belonging to the university. (See *Oxford University.*) Oxford depends mostly on the university, and on its attractions as a place of residence. Pop. 53,049.—The county is bounded by Northampton, Warwick, Gloucester, Berks and Buckingham; area, 750 sq. miles, of which more than five-sixths are under crops or in grass. The south part of the county presents alternations of hill and dale, the former, particularly the Chiltern Hills, being beautifully varied with fine woods, tracts of arable land, and open sheep downs. The central parts are more level, and are also adorned by numerous woods. Much of the soil is well adapted for the growth of green crops and barley. The grasslands are also rich and extensive, dairy husbandry is largely practiced, and great quantities of butter are made. Manufactures are of little importance. The principal rivers are the Thames or Isis, Thame, Evenlode, Cherwell and Windrush. Pop. 199,277.

Oxford, Lord. See *Harley.*

Oxford-Clay, in geology, a bed of dark-blue or blackish clay, interposed between the Lower and Middle Oölites, so called from its being well developed in Oxfordshire. It sometimes attains a thickness of from 200 to 500 feet, and abounds in beautifully preserved fossil shells of belemnites, ammonites, etc.

Oxford University, one of the two great English universities, established in the middle ages, and situated in the city of Oxford (which see). Like Cambridge it embraces a number of colleges forming distinct corporations, of which the oldest is believed to be University College, dating from 1253, though Merton College was the first to adopt the collegiate system proper. The following list contains the name of the colleges, with the time when each was founded:—

1.	University College	1253
2.	Balliol College	1268
3.	Merton College	1274
4.	Exeter College	1314
5.	Oriel College	1326
6.	Queen's College	1340
7.	New College	1379
8.	Lincoln College	1427
9.	All Souls' College	1437
10.	Magdalen College	1458
11.	Brasenose College	1509
12.	Corpus Christi College	1516
13.	Christ Church College	1546
14.	Trinity College	1554
15.	St. John's College	1555
16.	Jesus College	1571
17.	Wadham College	1612
18.	Pembroke College	1624
19.	Worcester College	1714
20.	Keble College	1870
21.	Hertford College	1874

There are also two 'Halls,' St. Mary Hall and St. Edmund Hall, which are similar institutions, but differ from the colleges in not being corporate bodies.

Oxford University is an institution of quite the same character as that of Cambridge. (See *Cambridge, University of.*) Most of the students belong to and reside in some college (or hall), but since 1869 a certain number have been admitted without belonging to any of these institutions. The students receive most of their instruction from tutors attached to the individual colleges, and those of each college dine together in the college hall and attend the college chapel. The ordinary students are called 'commoners.' There are four terms or periods of study, known as Michaelmas, Hilary or Lent, Easter and Trinity or Act. The two latter have no interval between them, so that the terms of residence are three of about eight weeks each. The degrees conferred are those of Bachelor and Master in Arts, and Bachelor and Doctor in Music, Medicine, Civil Law and Divinity. Twelve terms of residence are required for the ordinary degree of B.A. No further residence is necessary for any degree, and no residence whatever is required for

degrees in music. Any B.A. may proceed to the degree of M.A. without further examination or exercise, in the twenty-seventh term from his matriculation, provided he has kept his name on the books of some college or hall, or upon the register of unattached students for a period of twenty-six terms. In the case of all other degrees (except honorary ones) some examination or exercise is necessary. Women were admitted to the examinations in 1884, but do not receive degrees. Three colleges for women have been established: Somerville Hall, Lady Margaret Hall and St. Hugh's Hall. Mansfield College, for the education of men for the nonconformist ministry, was established in 1888. The total number of students is about 3000. The total number of professorships, etc., in the university is about fifty. The total annual revenues are between $2,000,000 and $2,500,000. The institutions connected with the university include: the Bodleian Library (the second in the kingdom), the Ashmolean Museum, Botanic Gardens, Taylor Institution for modern languages, University Museum, Radcliffe Library, Observatory and Indian Institute. Affiliated Colleges are: St. David's College, Lampeter (1880); University College, Nottingham (1882); and Firth College, Sheffield (1886).

Oxides (oks'idz), the compounds of oxygen with one other element; thus hydrogen and oxygen form *oxide of hydrogen* or *hydrogen oxide*, oxygen and chlorine form a series of *oxides of chlorine*, oxygen and copper form *oxide of copper* or *copper oxide*, and so on. When two oxides of the same element exist, the name of that which contains the greater proportion of oxygen ends in *ic*, while the name of the oxide containing less oxygen ends in *ous;* thus we have N_2O, called *nitrous oxide*, and N_2O_2, called *nitric oxide*. If there be several oxides they may be distinguished by such prefixes as *hypo*, *per*, etc., or by the more exact prefixes *mono*, *di*, *tri*, *tetra*, etc. For the different oxides see the articles on the individual chemical elements.

Oxlip (oks'lip; *Primŭla elatior*), a kind of primrose, so called from some resemblance in the flowers to the lips of an ox, and intermediate between the primrose and cowslip.

Ox-peckers (oks'pek-ėrs), a name for certain African birds, also known as *Beef-eaters* (which see).

Oxus, Amoo, Amoo-Daria, or Jihoon, a large river in Central Asia, which has its sources between the Thian Shan and Hindu Kush ranges in the elevated region known as the Pamir, flows W. through a broad valley, receiving many affluents, and N. W. through the deserts of western Turkestan, bordering on or belonging to Bokhara and Khiva, to the southern extremity of the Sea of Aral, where it forms an extensive marshy delta. It is generally held that the lower part of the course of the Oxus was at one time different from what it is now, and that the river entered the Caspian Sea. The principal head-stream of the Oxus is by some considered to be the Panja River, which rises in a lake of the Great Pamir, at a height of 13,900 feet. The Oxus for a considerable distance forms the boundary between Afghanistan and Bokhara. Total course, 1300 miles.

Oxychloride (oks-i-klō'rīd), a compound of a metallic oxide with a chloride; as, oxychloride of iron.

Oxycoccus (oks-i-kok'us), a genus of plants of the natural order Vacciniaceæ, commonly known as the cranberry (which see).

Oxyfluoride (oks-i-flö'u-rīd), a compound of an oxide with a fluoride; as, the oxyfluoride of lead.

Oxygen (oks'i-jen), a gas which is the most widely distributed of all the elements. Eight-ninths by weight of water, one-fourth of air, and about one-half of silica, chalk and alumina consist of oxygen. It enters into the constitution of nearly all the important rocks and minerals; it exists in the tissues and blood of animals; without it we could not live, and by its agency disintegration of the animal frame is carried on after death. All processes of respiration are carried on through the agency of oxygen, all ordinary processes of burning and of producing light are possible only in the presence of this gas. Oxygen was first isolated in 1774 by Joseph Priestley, who gave to the new gas which he had discovered the name of *dephlogisticated air*. Lavoisier, the year following Priestley's discovery, put forward the opinion that the new gas was identical with the substance which exists in common air, and gave it the name oxygen—from the Greek *oxys*, acid, and root *gen* to produce—because he supposed that it was present as the active constituent in all acids; modern experiments, however, prove that it is not necessary in all cases to acidity or combustion. Oxygen is invisible, inodorous, and tasteless; it is the least refractive, but the most magnetic of all the gases; it is rather heavier than air, having a specific gravity of 1.1056, referred to air as 1.00; it is soluble in water to the extent of about three volumes in 100 volumes of water at ordinary tempera-

tures. Oxygen was liquefied for the first time in 1877 by the application of intense cold and pressure; it has since then been solidified. It is possessed of very marked chemical activity, having a powerful attraction for most of the simple substances, the act of combining with which is called oxidation. Some substances when brought into contact with this gas unite with it so violently as to produce light and heat; in other cases oxidation is much more gradual, as in the rusting of metals. The presence of oxygen is, so far as we know, one of the physical conditions of life. In inspiring we receive into the lungs a supply of oxygen; this oxygen is carried by the blood to the various parts of the body, and there deposited to aid in the functions of the organs; the deoxygenated blood returns to the lungs, and again receives a fresh supply of the necessary oxygen. Trees and plants evolve oxygen, which is formed by the decomposition of the carbonic acid absorbed by the leaves from the atmosphere. This is due to the action of the sun's rays and the chlorophyll or green coloring matter of the leaves. When oxygen unites with another element the product is called an *oxide*. The oxides form a most important series of chemical compounds (see *Oxides* and the articles on the various chemical elements). The power of supporting combustion is one of the leading features of oxygen, and until the discovery of oxygen no well-founded explanation of the facts of combustion was known. Oxygen exists in another form different from that of the ordinary gas; in this form it exhibits many marked peculiarities. See *Ozone*.

Oxyhydrogen Blowpipe. See *Blowpipe*.

Oxyhydrogen Light (oksi - hī'drō-jen), or LIME-LIGHT, a brilliant light produced when a jet of mixed oxygen and hydrogen gas is ignited and directed on a solid piece of lime. It is commonly used in magic lantern exhibitions; and the two gases are kept in separate air-tight bags, or iron cylinders into which the gas is forced under very high pressure. From these receptacles tubes conduct the gases to meet in a common jet.

Oxyhydrogen Microscope, one in which the object is illuminated by means of the oxyhydrogen light, and a magnified image of it thrown on a screen.

Oxymoron (oks-i-mō'ron), in rhetoric, a figure in which an epithet of quite contrary signification is added to a word; as, cruel kindness.

Oxyrhynchus (-rin'kus), a celebrated Egyptian fish, sacred to the goddess Athor, and represented in sculptures and on coins. It was anciently embalmed.

Oxyria (ok-sir'i-a), a genus of plants of the nat. order Polygonaceæ. *O. reniformis* (mountain-sorrel) is found on the summits of the White Mountains, and north to the Arctic Sea.

Oxysalts (oks'i-sąltz), in chemistry, those salts which contain oxygen. The oxysalts form a very important series of substances; among them are included all the sulphates, nitrates, oxides, hydrates, chlorates, carbonates, borates, silicates, etc.

Oxysulphide (oks-i-sul'fīd), a compound formed by the combination of sulphur and oxygen with a metal or other element. The oxysulphides are not very numerous or important.

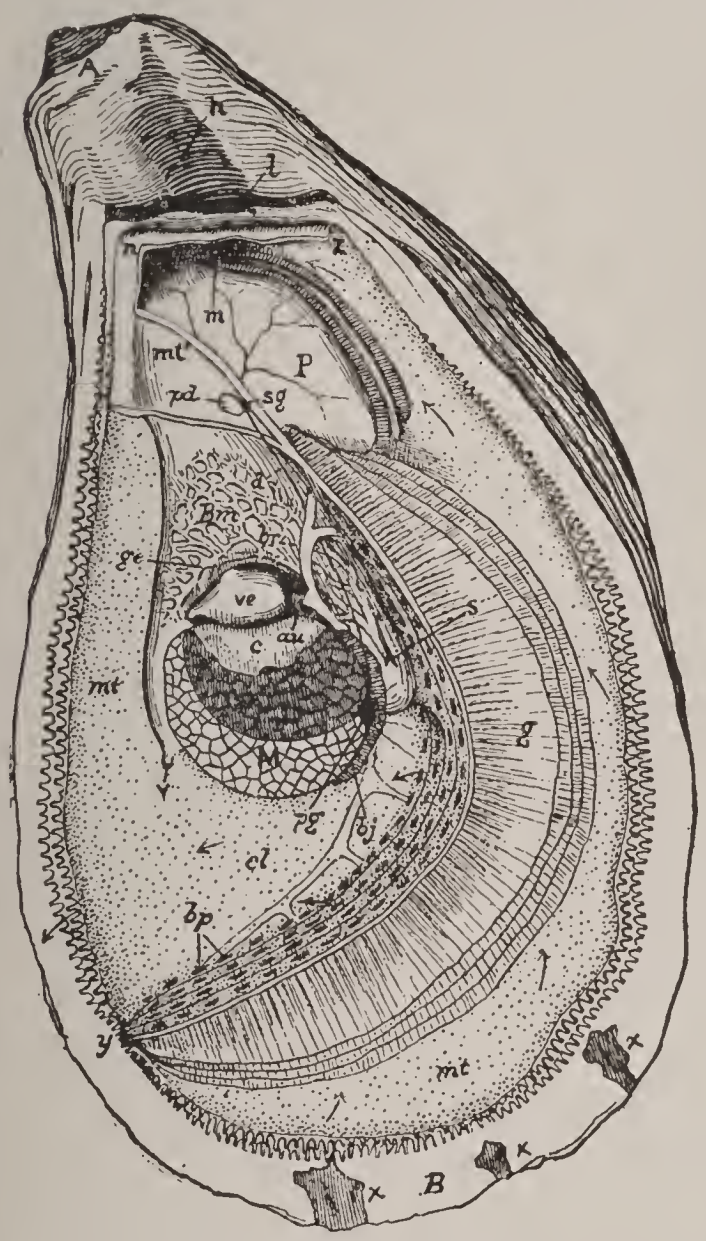
Oyama, Marquis (ō-yō'mȧ), a Japanese general, born about 1842. As chief-of-staff and field marshal, he was commander-in-chief in the war with Russia in 1904, and commanded in person in the latter part of that victorious campaign. He received the British Order of Merit in 1906.

Oyer and Terminer (o'yėr, tėr'minėr; Law). The name of courts of criminal jurisdiction in the United States, generally held at the same time with the Court of Quarter Sessions, and by the same judges, and which have power, as the terms imply, *to hear and determine* all treasons, felonies, and misdemeanors committed within their jurisdiction. The terms Oyer and Terminer are derived from the Old French.

Oyster (ois'tėr), an edible mollusc, one of the Lamellibranchiate Mollusca, and a near ally of the mussels, etc. It belongs to the genus *Ostræa*, family *Ostræidæ*, the members of which are distinguished by the possession of an inequivalve shell, the one half or valve being larger than the other. The shell may be free, or attached to fixed objects, or may be simply imbedded in the mud. The foot is small and rudimentary, or may be wanting. A single (adductor) muscle for closing the shell is developed. The most common American species is *Ostræa virginiāna*, which is found on the Atlantic coast from the Gulf of St. Lawrence to the Gulf of Mexico. The most favorable bottom and locality for oyster-beds appear to be those situated in parts where the currents are not too strong, and where the sea-bed is shelving, and covered by mud and gravel deposits.

Ostræa edūlis is the most familiar European member of the genus. The fry or fertilized-ova of the oysters are termed 'spat,' and enormous numbers of ova are produced by each individual from May or June to September—the spawning season. The spat being discharged, each embryo is found to consist of a little body inclosed within a minute but perfectly formed shell, and possessing vibratile filaments or cilia, by which the young animal at first swims freely about, and then attaches itself to some object. In about three years it attains its full growth. The oysters congregate together in their attached state to form large submarine tracts or 'oyster-beds,' as they are termed.

The United States and France are the chief seats of the oyster industry. In the United States the natural oyster-beds are



Anatomy of the Oyster.

A. Hinge or anterior umbonal end of the left valve of an adult oyster, upon which the soft parts of the animal are represented as they lie *in situ*, but with the greater part of the mantle of the right side removed.

a u. The auricle of the right side of the heart contracted.

B. Posterior or ventral end of the left valve, which in life is usually directed upward more or less, and during the act of feeding and respiration is separated slightly from the margin of its fellow of the opposite side to admit the water for respiration, and which also contains the animal's food in suspension.

b m. Body-mass, traversed superficially by the generative ducts *g e.*

b j. The organ of Bojanus, or 'renal' organ, of the right side of the oyster. (The ducts which it sends into the mantle are not shown, nor is its connection with the genito-urinary sinus *s* indicated.)

b p. The large branchial pores which open from the subdivided cavities of the pouch-like gills *g* into the cloaca *cl.*

b r. The anterior branchiocardiac "vein," which conveys part of the blood from the gills to the auricle.

c. Right pericardiac membrane, which has been thrown back over M in order to expose the heart *ve* and *au.*

c l. Cloacal space, through which the water used on respiration passes out, and into which the excrement of the animal is discharged from the vent *v.*

d. Nervous commissure of the right side, which connects the paricto-splanchnic with the supra-œsophageal ganglion.

g. Gills, which extend as four flattened transversely, subdivided sacks from the palps *p* to the point *y*, at the edge of the mantle.

g e. Superficial network of the generative ducts as they appear when the oyster is yawning.

h. Groove in the hinge end of the left valve, which receives the ridge developed in the corresponding situation on the right one.

l. Dark brown elastic body or ligament by which the valves are held together at the hinge.

M. Great abductor muscle, which is here viewed from the end, and which is attached to the inner faces of the valves over the dark purple scars. It opposes the elastic ligament and closes the valves, and corresponds to the posterior abductor muscle of dimyary mollusks

m. Mouth.

m t. Mantle of the left side fringed with two rows of tentacles; *m t'*, portion of the mantle of the right side.

n to *z* marks the extent to which the right and left leaves of the mantle are joined together; the hood thus formed above and at the sides of the palps is called the cucullus.

P. Palps exposed, a part of the cucullus on the right being cut away.

p d. Pedal muscle of right side, which is also inserted upon the shell of the same side.

p g. Parieto-splanchnic ganglion.

s. Genital opening of the right side.

s g. Supraœsophageal ganglion.

v. Vent or anus.

v e. Ventricle of the heart, which is dilated, or in the condition of diastole.

(*x x x.* Areas at the edge of the inner surface of the shell, where intruded mud has been inclosed by a thin laminæ of shelly matter deposited by the mantle.

y. Point at the posterior extremity of the gills, where the right and left leaves of the mantle are joined together by the membrane which supports the gills.

still a source of great wealth, while in Europe the native beds have long since been practically destroyed. Long Island Sound and Chesapeake Bay are leading fields in the oyster industry, and the canning and shipping of oysters an important part of the industries of Baltimore. Large quantities of American oysters are now sent to Europe; and the American are generally larger and better flavored than the European. In Europe the oyster industry is rapidly ceasing to be oyster-fishery and becoming oyster culture, and this is practiced to some extent in the United States. The most elaborate system of oyster culture is that practiced at Arcachon in France and on the island of Hayling, near Portsmouth, in England. In the breeding season the young oysters are collected upon tiles or hurdles, and laid down in artificial ponds or troughs, where they are kept until they are sent to market.

Oyster Bay, a residence place and summer resort in Nassau Co., New York, on an inlet of Long Island Sound, about 30 miles eastward from New York City. Pop. 21,802. Ex-President Roosevelt resides here.

Oyster-catcher (*Hæmatŏpus ostralegŭs*), a bird belonging to the order of Grallatores or Wading Birds, nearly allied to the plovers (Charadriidæ), and popularly known as the 'sea-pie.' It is distinguished by its long, thin, wedge-shaped, orange-colored bill, and its black and white plumage. It is a permanent resident in Britain, and frequents the sea-coast, where it feeds on Mollusca.

Ozæna (ō-zē′na), a fetid ulcer in the nostril, which often follows scarlatina, or even a severe cold, but which may be a symptom of cancer or other similar disease.

Ozaka See *Osaka.*

Ozark Mountains (ō′zärk), a chain of low mountains, intersecting in a southwest direction the States of Missouri and Arkansas; height about 1400 feet.

Ozieri (ō-zē-ā′rē), a town in Sardinia, province of Sassari, the seat of a bishop. Pop. 9555.

Ozokerite (ō-zō′ke-rīt), a fossil resin of a pleasantly aromatic odor, existing in the bituminous sandstones of the coal measures, and occurring chiefly in Galicia, in Austria. Small quantities of it have been found at Uphall in Linlithgowshire, and at Urpeth Colliery, Newcastle-on-Tyne, and various other places. It contains carbon and hydrogen in the proportion of 86 per cent. of the former to 14 per cent. of the latter. When purified it forms a hard paraffin, from which excellent candles are manufactured. It is used to some extent as an adulterant of bees'-wax.

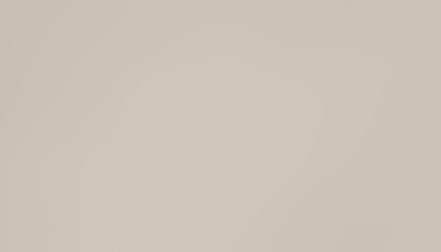
Ozone (ō′zōn), a modified—technically an *allotropic*—form of oxygen. Two volumes of ozone contain three volumes of oxygen condensed to two volumes; the formula of ozone is therefore O_3. Ozone exists in small quantities in pure country air, and is produced in various ways. When an electric machine is set in operation a peculiar smell may be perceived; after a discharge of lightning the same smell is perceptible. The substance which manifests this odor is ozone (from Greek *ozō*, I smell), and in each of those cases ozone is produced. Ozone acts as a very powerful oxidizer; for this reason it is of great service in the atmosphere, as it so readily oxidizes, and thus renders comparatively unhurtful, animal effluvia and other obnoxious products of animal or vegetable decomposition. Ozone rapidly bleaches indigo, converting it into a white substance called isatin, which contains more oxygen than the indigo itself.

P

P, the sixteenth letter and twelfth consonant in the English alphabet. It is one of the mutes and labials, and represents a sound produced by closely compressing the lips till the breath is collected, and then letting it issue. See *B*.

Pabna (pub'nȧ), chief town of district of same name, Bengal, on the river Ichamati; contains the usual public buildings and a large indigo factory. Pop. 18,424.—The district forms the southeast corner of the Rajshabi Division, and is bordered on the east by the Brahmaputra, and on its southwest frontier by the Ganges. Area, 1847 square miles. Pop. 1,420,461.

Paca (pȧ'ka; *Cœlogĕnys*), a genus of rodents allied to the capybaras, cavies, and agoutis. The common paca (*C. paca*) is one of the largest of the rodents, being about 2 feet long and about 1 foot high. In form it is thick and clumsy, and the tail is rudimentary.



Common Paca (*Cœlogĕnys paca*).

In habits the pacas are chiefly nocturnal and herbivorous. They excavate burrows, run swiftly, and swim and dive with facility. They are found in the eastern portion of South America, from Paraguay to Surinam. The flesh is said to be savory.

Pacay (pa-kā'), a Peruvian tree (*Prosōpis dulcis*), nat. order Leguminosæ, suborder Mimosæ. The pure white, flaky matter in which the seeds are embedded is used as food, and the pods, which are nearly two feet long, serve for feeding cattle. The mesquite (which see) belongs to the same genus.

Pace (pās), a measure of length, used as a unit for long distances. It is derived from the Latin *passus*, which was, however, a different measure, the Latin *passus* being measured from the mark of the heel of one foot to the heel of the same foot when it next touched the ground, thus stretching over two steps; while the English pace is measured from heel to heel in a single step. The Latin pace was somewhat less than 5 feet; the English and American military pace at the ordinary marching rate is 2½ feet, and at double quick time 3 feet.

Pacha. See *Pasha*.

Pacheco (pȧ-chā'kō), Francisco, a Spanish painter, born at Seville in 1571; died in 1654. He was the pupil of Luis Fernandez, and the instructor of Velasquez, who became his son-in-law. In his own time he attained great popularity. Of his numerous portraits those of his wife and of Cervantes were the most admired. Pacheco was the author of a treatise on the *Art of Painting*.

Pachira (pa-kī'ra), a genus of tropical American trees allied to the baobab-tree. The largest flowered species, *P. macrantha*, found in Brazil, attains a height of 100 feet, and has flowers 15 inches long. The plants are familiar in our hothouses under the name of *Carolinea*.

Pachomius (pa-kō'mi-us), a scholar of St. Antony, was the first who introduced, instead of the free hermit life, the regular association of monks living in cloisters, having founded one of them on Tabenna, an island of the Nile, about 340 A.D. He was also the founder of the first nunnery, and at his death is said to have had the oversight of above 7000 monks and nuns.

Pachuca (pȧ-chö'kȧ), a town of Mexico, capital of the state Hidalgo, in a rich silver-mining region, about 8200 feet above the sea. Pop. 37,487.

Pachydermata (pak-i-dĕr'ma-ta), the name formerly applied to the division or order of Mammalia, including the elephants, tapirs, hippopotamus, rhinoceros, swine, and hyrax — all of which forms were dis-

tinguished by their thick skin, by their non-ruminant habits, and by their possessing more than one hoof on each leg. The group is now divided among the various suborders of the Ungulata. See *Ungulata.*

Pachyglossæ (pak-i-glos'sē), a section of saurian reptiles having a thick, fleshy tongue, convex, with a slight nick at the end. It includes the iguanas and agamas.

Pachyrhizus (pak-i-rī'zus), a genus of tropical leguminous plants common to both hemispheres. *P. angulatus* has fleshy roots of great length and thickness, which are used in times of scarcity as an article of diet.

Pacific Ocean (pa-sif'ik; originally designated the *South Sea*), that immense expanse of water which extends between the North and South American continents and Asia and Australia. It is the largest of the oceans, exceeding in compass the whole of the four continents taken together, and occupying more than a fourth part of the earth's area, and fully one-half of its water surface. On the west it extends to the Indian Ocean, and has several more or less distinct seas connected with it — the China Sea, Yellow Sea, Sea of Japan, Sea of Okhotsk, etc., on the north it communicates with the Arctic Ocean by Behring Straits, on the south it is bounded by the Antarctic Ocean, and on the east it joins the Atlantic at Cape Horn. Within this enormous circumference it includes the numerous islands composing the groups of Australasia and Polynesia, and those adjoining America and Asia. The average depth of the Pacific appears to be greater than that of the Atlantic, and its bed more uniform. Recent soundings to the south of the Friendly Islands give a depth of from 4295 to 4430 fathoms (about five miles). The deepest soundings known are 4475 fathoms s. of the Ladrone Islands, and 4655 fathoms N. E. of Japan. (See *Ocean.*) In the Pacific the tides never attain the maximum heights for which some parts of the Atlantic and Indian oceans are celebrated. On all the west coast of America the rise of the tide is usually below 10 feet, and only in the Bay of Panama does it vary from 13 feet to 15 feet. The trade-winds of the Pacific are not so regular in their limits as those of the Atlantic, and this irregularity extends over a much wider region in the case of the southeast trade-wind than in the case of the northeast. The cause of this is the greater number of islands in the South Pacific Ocean, which, especially in the hot season, disturb the uniformity of atmospheric pressure by local condensations. The northeast trade-wind remains the whole year through within the northern hemisphere. The southeast trade-wind, on the other hand, advances beyond the equator, both in summer and winter, still preserving its original direction. In the region stretching from New Guinea and the Solomon Islands southeastwards, there are no regular winds. The zones of the two trade-winds are separated by regions of calms and of light winds, the limits of which vary, of course, with the varying limits of these zones. In the Chinese seas the terrible typhoon occasionally rages, and may occur at any season of the year. As to the chief currents of the Pacific, see *Currents, Marine.* The Portuguese were the first Europeans who entered the Pacific, which they did from the east. Balboa, in 1513, discovered it from the summit of the mountains which traverse the Isthmus of Darien. Magellan sailed across it from west to east in 1520–21. Drake, Tasman, Behring, Anson, Byron, Bougainville, Cook, Vancouver, Lapérouse, and others, traversed it in different directions in the seventeenth and eighteenth centuries.

Pacinian Corpuscles (pa-sin'i-an), in anatomy, minute oval bodies appended to the extremities of certain nerves, especially those of the hands and feet, probably connected with the sense of touch; named after an Italian anatomist.

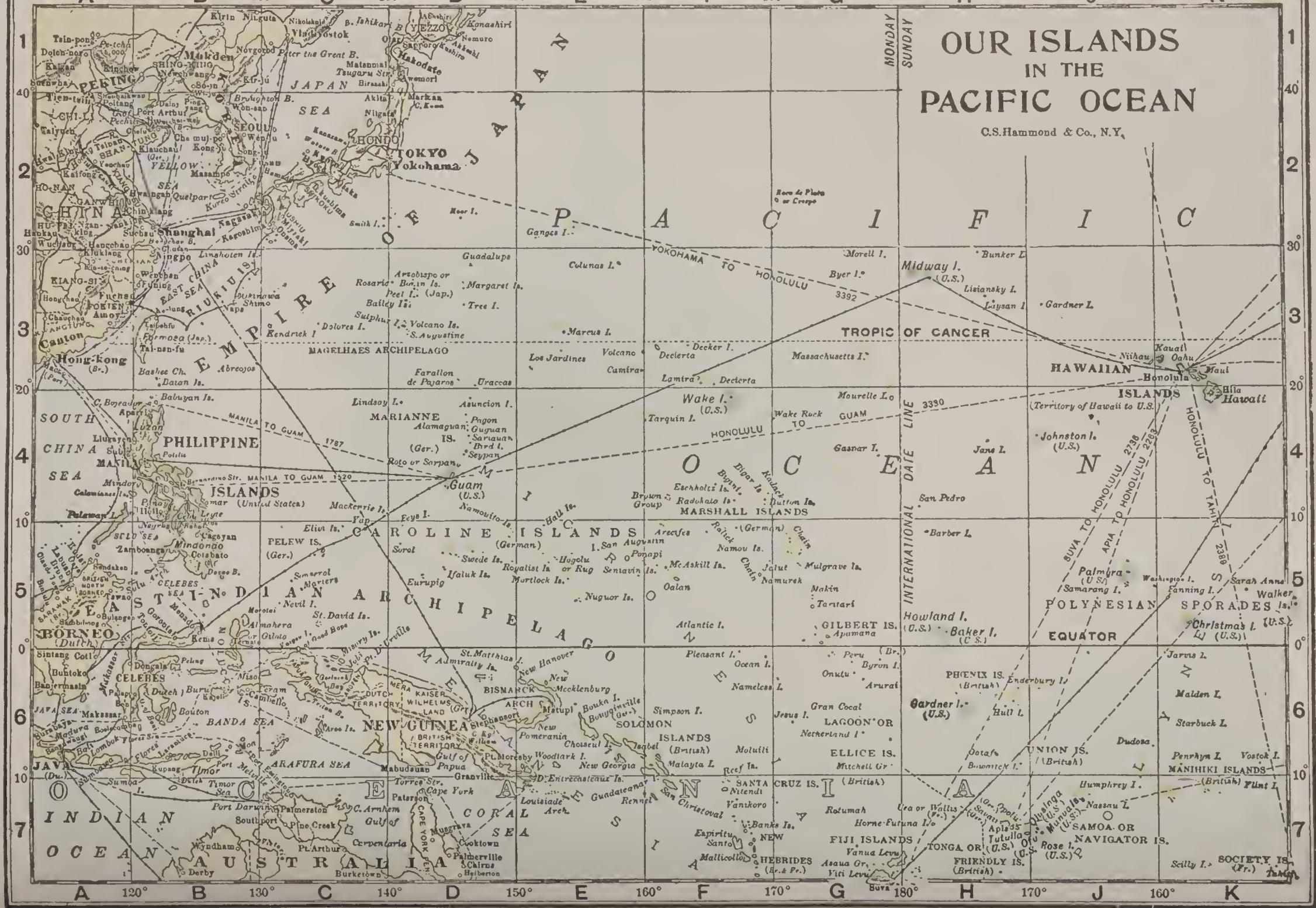
Packer (pak'er), Asa, philanthropist, was born at Groton, Connecticut in 1806; died in 1879. He was the projector of the Lehigh Valley Railroad and served in the Pennsylvania Legislature and in Congress. He is best known from his liberal endowment of Lehigh University, at Bethlehem, Pa.

Packard (pak'ard), Alpheus Spring, zoologist, was born at Brunswick, Maine, in 1839; died in 1905. He became an assistant surgeon in the army, a lecturer on natural history, and in 1873 professor of zoology and geology in Brown University. He was also attached to state and national scientific surveys and to the United States Entomological Commission. He wrote *Guide to the Study of Insects, Outlines of Comparative Zoology, Half-hours With Insects,* etc.

Packfong (pak'fong), a Chinese alloy of a silver-white color, consisting (though different accounts are given of its composition) of copper, zinc, nickel, and iron. It was formerly used by watchmakers, mathematical instrument makers, and others, for a variety of

OUR ISLANDS IN THE PACIFIC OCEAN

C.S. Hammond & Co., N.Y.


MONDAY
SUNDAY
INTERNATIONAL DATE LINE
PACIFIC OCEAN
JAPAN
SEA OF JAPAN
YEZZO
HONDO
Hakodate
Sapporo
Tokyo
Yokohama
Akita
Niigata
Aomori
Morioka
Sendai
Mukden
Peking
Tientsin
Port Arthur
Dairen
Seoul
Chemulpo
Fusan
Gensan
Vladivostok
Nikolaievsk
Nagasaki
Kagoshima
Osaka
Kobe
Nagoya
Shimonoseki
Yokosuka
Matsumai
Tsugaru Str.
Bruhgton B.
Peter the Great B.
Norgorod
Kirin
Niuguta
Talienwan B.
Kiaochau
Weihaiwei
Chefoo
Shanghai
Nanking
Chinkiang
Hankau
Ichang
Kiukiang
Wuchang
Hangchow
Ningpo
Foochow
Amoy
Swatow
Canton
Hong-Kong
Macao
Haikau
Lappa
Kelung
Formosa (Jap.)
Tai-nan-fu
Pescadores
Linschoten Is.
Bashee Ch.
Babuyan Is.
Luzon
Aparri
Lingayen
Manila
Subig
Corregidor
Batangas
Iloilo
Cebu
Leyte
Mindoro
Palawan I.
Sulu Sea
Zamboanga
Jolo
Sandakan
Labuan
Brunei
Kuching
Sarawak
Celebes Sea
Menado
Gorontalo
Kema
Bulungan
Tarakan
Sibutu
Sibuko Bay
Tawao
Jesselton
Mantanani Is.
Kudat
Tawi Tawi
Sulu Archipelago
Basilan
Dapitan B.
Dumaguete
Cotabato
Davao B.
Davao
Sarangani B.
Sarangani Is.
Talaud Is.
Nanoose
Gaspar Str.
Balabac Str.
Balabac I.
Palawan
Mindoro Str.
Verde I.
Mariveles
Bataan Is.
Abrecojos
Formosa Str.
Bashee Ch.
Babuyan Is.
Batan Is.
Luzon Str.
Bonin Is.
Parry I.
Rosario
Arzobispo or Bonin Is.
Peel I. (Jap.)
Bailey Is.
Sulphur I.
Volcano Is.
S. Augustine
Kendrick I.
Dolores I.
Margaret Is.
Tree I.
Guadalupe
Columas I.
Ganges I.
Rocca de Plata or Crespo
Smith I.
Roer I.
Morell I.
Byer I.
Bunker I.
Midway I. (U.S.)
Lisiansky I.
Laysan I.
Gardner I.
Kauai
Niihau
Oahu
Maui
Honolulu
Hawaiian Islands
(Territory of Hawaii to U.S.)
Hilo
Hawaii
YOKOHAMA TO HONOLULU 3392
TROPIC OF CANCER
MAGELHAES ARCHIPELAGO
Decker I.
Massachusetts I.
Los Jardines
Volcano
Camira
Lamira
Decierta
Farallon de Pajaros
Uraccas
Wake I. (U.S.)
Mourelle I.
Wake Rock
GUAM
HONOLULU TO GUAM 3330
Tarquin I.
Gasmar I.
Johnston I. (U.S.)
Jane I.
HONOLULU TO TAHITI 2389
HONOLULU TO APIA 2263
HONOLULU TO SUVA 2738
MANILA TO GUAM 1787
MANILA TO GUAM 1520
Roto or Sarpanu
Guam (U.S.)
Mackenrie Is.
Yap
Eeye I.
Eliva Is.
PELEW IS. (Ger.)
Surol
Eurupig
Ifaluk Is.
Swede Is.
Hall Is.
Namouito Is.
Mortlock Is.
Royalist Is
Hogolu or Rug
Sentavin Is.
Nuguor Is.
Oalan
Ponapi
McAskill Is.
Arecifes
Ralick Chain
Namou Is.
Jalut
Mulgrave Is.
Namurek
Makin
Tarawai
Atlantic I.
Apamama
GILBERT IS.
MARSHALL ISLANDS
Eschholtz Is.
Bigar Is
Radaklab Is.
Brown Group
Dutton Is.
Kadack
Barber I.
San Pedro
Howland I. (U.S.)
Baker I. (U.S.)
EQUATOR
Palmyra (U.S.)
Washington I.
Fanning I.
Samarang I.
Sarah Anne
Walker
Christmas I. (U.S.)
POLYNESIAN SPORADES Is.
Jarvis I.
Malden I.
Starbuck I.
Penrhyn I.
Vostok I.
MANIHIKI ISLANDS (British)
Flint I.
Humphrey I.
Nassau I.
Suwarrow I. (U.S.)
Manua Is. (U.S.)
Rose I. (U.S.)
Aplu
Tutuila (U.S.)
Oru
SAMOA OR NAVIGATOR IS.
Scilly I.
SOCIETY IS. (Fr.)
Tahiti
Pleasant I.
Ocean I.
Peru (Br.)
Byron I.
Onutu
Arurat
Nameless I.
PHOENIX IS. (British)
Enderbury I.
Gardner I. (U.S.)
Hull I.
Jarvis I.
Gran Cocal
Jesus I.
Simpson I.
Netherland I.
SOLOMON ISLANDS (British)
LAGOON OR
ELLICE IS.
Mitchell Gr.
Malaita I.
Malulii
Isabel
Choiseul I.
New Georgia
Reef Is.
Dudosa
Potatau
Bowditch I.
UNION IS. (British)
Olosinga (U.S.)
Swains (U.S.)
Apia
TONGA OR FRIENDLY IS. (British)
Vavau
Nukualofa
Tofua
Horne-Futuna Is.
Rotumah
Wallis (Fr.)
Uea or Wallis (Fr.)
Futuna
Alofi
Niuafu
Keppel I.
Penrhyn I.
Nassau I.
Suwarrow I.
Manua Is.
Rose I.
Swains
Oru
Apia
Tutuila
Olosinga
Scilly I.
Society Is.
Tahiti
Fiji Islands
Vanua Levu
Viti Levu
Suva
Mallicollo
Espiritu Santo
Banks Is.
NEW HEBRIDES (Br. & Fr.)
Vanikoro
Nitendi
SANTA CRUZ IS. (British)
Gower I.
Cherry I.
Swallow I.
Byron I.
Carteret I.
Egmont I.
Ocean I.
Pleasant I.
Nameless I.
Gardner I. (U.S.)
Hull I.
Jarvis I.
Malden I.
Starbuck I.
Penrhyn I.
Vostok I.
Manihiki Islands
Flint I.
Humphrey I.
Nassau I.
Suwarrow I.
Manua Is.
Rose I.
Swains
Oru
Apia
Tutuila
Olosinga
Scilly I.
Society Is.
Tahiti
Fiji Islands
Vanua Levu
Viti Levu
Suva
Mallicollo
Espiritu Santo
Banks Is.
New Hebrides
Vanikoro
Nitendi
Santa Cruz Is.
Gower I.
Cherry I.
Swallow I.
Byron I.
Carteret I.
Egmont I.
Ocean I.
Pleasant I.
Nameless I.
Gardner I.

purposes for which nickel alloys are now employed.

Pack-ice, in the Arctic seas, an immense assemblage of large floating pieces of ice. When the pieces are in contact the pack is said to be *closed;* when they do not touch, though very near each other, it is said to be *open.*

Paco. See *Llama.*

Pactolus (pak-tō'lus), in ancient times the name of a small river of Lydia, celebrated for its golden sand. It is now called *Sarabat.*

Pacuvius (pa-kū'vi-us), MARCUS, an ancient Roman tragic poet, born at Brundusium in 219 B.C., passed the greater part of his life at Rome, where he became famous both for his poetry and his paintings, retired to Tarentum during his last years, and died at the age of ninety in 129 B.C. Only fragments of his tragedies exist.

Padang (pä-däng'), a town in Sumatra, capital of a residency of the same name, and seat of the Dutch government of the West Coast, is the chief market in Sumatra for coffee and gold. The town embraces a Chinese settlement and a European quarter. Pop. 12,000.

Paddle (pad'l), a kind of oar used in propelling and steering canoes and boats by a vertical motion. It is shorter and broader in the blade than the common oar, and is used without any fulcrum on the edge of the boat. The boatmen sit with their faces looking in the direction in which the boat moves, and propel the boat by dipping the blade of the paddle in the water and pushing backwards. When there is only one boatman a paddle with two blades connected by a common handle is used.

Paddlefish, the *Polyŏdon spatŭla,* a large fish allied to the sturgeons, so named from the elongated, broad snout with which it stirs up the soft muddy bottom in search of food. It often reaches a length of from 5 to 6 feet. The paddlefishes are exclusively North American in their distribution, being found in the Mississippi, Ohio, and other great rivers of that continent.

Paddle-wheel, in steamships one of the wheels (generally two in number, one placed on each side of the vessel) provided with boards or floats on their circumferences, and driven by the engine for the ship's propulsion through the water. On rivers liable to such obstructions as floating trees, etc., a single paddle-wheel placed at the stern of the vessel is employed. The ship is propelled by the reaction of the water upon the floats. Most power is gained when the floats are vertical, passing through the water perpendicular to the direction of greatest pressure. The paddle-wheel, formerly common, is now almost entirely confined to river-boats; in ocean-going steamers, and commonly in river boats, it has given place to the screw.

Paddy (pad'i), a Malayan word universally adopted in the East Indies for rice in the husk, whether in the field or gathered.

Padella (pȧ-del'ȧ; Italian, a frying-pan), a shallow vessel used in illuminations. A number of them are partially filled with some kind of grease, in the middle of which is placed a wick, and are then placed so as to bring out when lighted the outlines of a building.

Paderborn (pä-der-born'), an ancient town in Prussia, province of Westphalia, 50 miles southeast of Münster. It is the see of a Roman Catholic bishop, and has a fine old cathedral, part of which dates from the 11th century. The manufactures are unimportant, but there is a considerable trade. Pop. (1905) 26,468.

Paderewski (pȧ-dā-rev'skē), IGNACZ JAN, pianist, born in Poland, 1860. He became one of the most talented of modern pianists and composers, became professor in the conservatories of Warsaw and Strasburg, and made very successful professional tours through Europe and the United States. He composed much music for the piano.

Padilla (pȧ-*dēl*'yȧ), JUAN LOPEZ DE, a popular Spanish hero, born in 1484, of a noble family in Toledo, was a leader in the insurrection of the Castilian towns (the so-called Communidades) against the arbitrary policy and Flemish advisers of Charles V. The fate of the insurrection was decided by the battle of Villalar, in which Padilla was wounded and taken prisoner. He was executed on the following day (April 24, 1521). His wife, Maria Pacheco, defended Toledo for some time after his death, and on its fall fled to Portugal. The names of Padilla and his wife are still household words among the Castilians.

Padishah (pȧ-di-shȧ'), a title assumed by the Turkish sultan and Persian shah, derived from *pad* (protector or throne), and *shah* (king, prince).

Padstow (pad'stō), a seaport in Cornwall, England, on the estuary of the Camel, 12 miles N. W. of Bodmin.

It is a very ancient place, and furnished ships for the siege of Calais in 1346. Pop. (1911) 2480.

Padua (pad′ū·å; Italian, *Padŏva;* Latin, *Patavium*), a city in Italy, capital of the province of the same name, 22 miles west of Venice, on a low flat on the Bacchiglione, which flows through it in several branches and is crossed by numerous bridges. The houses are lofty, the streets narrow, and several of these, as well as some of the squares, are lined with mediæval arcades. Of recent times the town has been improved by the opening up of new and the widening of old streets. The buildings most deserving of notice are the town-house or Palazzo della Ragione, an immense pile erected between 1172 and 1219, extending along the marketplace, standing upon open arches, with a lofty roof, said to be the largest in the world unsupported by pillars, and containing a large hall, adorned with mural paintings; the large mosque-like Church of St. Antonio, called Il Santo, begun about the year 1230 and finished in the following century; the Church of the Annunziata, the walls of which are covered with well-preserved paintings by Giotto, etc. The university, said to have been founded by the Emperor Frederick II in 1238, was long renowned as the chief seat of law and medicine in Italy; and very many names famous in learning and art are connected with Padua, such as Galileo, Scaliger, Tasso, Giotto, Lippo Lippi, and Donatello. Padua is the see of a bishop. Under the Romans it was a flourishing municipal town, and its history follows the course of events common to most of the cities of Italy on the decline and fall of the Roman Empire. Later it fell under the domination of Venice, whose fortunes it followed until 1866, when, with Venice, it became part of the kingdom of Italy. Pop. 82,283.—The province of Padua has an area of 854 square miles, and pop. of 434,322.

Paducah (pa-dū′kå), a city, capital of McCracken county, Kentucky, on the Ohio, not far from the mouth of the Tennessee, and about 48 miles above Cairo. It ships large quantities of tobacco, corn, pork and other products, and has railroad repair shops, foundries and machine shops, and various other industries. Pop. 22,760.

Padula (på-dŏ′lå), a town of South Italy, province of Salerno. Pop. 5000.

Pæan (pē′an), in Greek, a hymn to Apollo or to other deities, or a song in praise of heroes. A pæan was sung, previous to battle, in honor of Ares (Mars), and after a victory, in praise of Apollo.

Pædobaptists. See *Baptists.*

Pæony. See *Peony.*

Pæstum (pēs′tum; Greek, *Posidonia*), an ancient Greek city of Italy, on the Gulf of Salerno. It is celebrated by the Latin poets for the fragrance of its twice-blowing roses, and its mild and balmy air. Little now remains of it but some fragments of its walls and the well-preserved ruins of two Doric temples of extreme interest. The city was settled by a Greek colony from Sybaris, B.C. 524.

Paez (på-eth′), JOSÉ ANTONIO, one of the founders of South American independence, born of Indian parents near Acarigua, Venezuela, in 1790; entered the patriot army in 1810, rose to general of division in 1819, and took a leading part in the battle of Carabobo, which secured the independence of Colombia in 1821. At first he acted in concert with Bolivar, but in 1829 he placed himself at the head of the revolution which culminated in the independence of Venezuela, of which he was the first president. He died in exile at New York in 1873.

Paganini (på-gå-nē′nē), NICCOLO, a celebrated violinist, born in 1784 at Genoa; died at Nice in 1840. His father, who had some knowledge of music, and discerned the talents of his son, put him at a very early age under the best masters (Costa, Rolla, Paer) to learn music, and particularly the violin. With this instrument his progress was so rapid that at the age of nine he was able to perform in public at Genoa. His first engagement was in 1805, at Lucca, where he found a patroness in Princess Eliza, Bonaparte's sister. In 1813 he left Lucca for Milan, and in 1828 visited Vienna. From this period his fame was world-wide. The wonder which he excited was caused not merely by the charm of his execution and his extraordinary skill, but also by his external appearance, which had something weird and even demoniacal in it. After visiting almost all the great towns of Germany he made a musical tour through France and Great Britain, realizing immense gains. His last years were spent at a villa near Parma.

Pagans (pā′ganz), the worshipers of many gods, the heathen; so called by the Christians because after Christianity had become predominant in the towns the ancient polytheistic faith still lingered in the villages (*pagi*) and country districts.

Page (pāj), a youth retained in the family of a prince or great personage as an honorable servant, to attend in visits of ceremony, carry messages, bear up trains, robes, etc. In the United States pages are the errand-boys in Congress.

Page, THOMAS NELSON, novelist, born at Oakland, Virginia, in 1853. He practiced law in Richmond. He has written attractive stories of Southern life, including *Marse Chan*, *Santa Claus's Partner*, *Gordon Keith*, *The Old Dominion*, and many others.

Paget (paj'et), SIR JAMES, surgeon, born at Great Yarmouth, England, in 1814; died in 1899. He was admitted into the College of Surgeons in 1836, and became Hunterian professor of surgery and president of the college (1875). He gained a high reputation as a surgeon and physiologist, and published *Lectures on Clinical Pathology*, *Clinical Lectures*, etc.

Paget, VIOLET, writer, born in England in 1856; resided for many years in Italy. Under the pen-name of Vernon Lee she published *Studies of the Eighteenth Century in Italy*, *Miss Brown*, *Hauntings*, *Renaissance Fancies and Studies*, etc.

Paging Machine, a machine for printing consecutive numbers on the pages of a book, banknotes and checks, railway tickets, etc. Several machines of this kind have been invented, all of which consist essentially of a number of revolving discs bearing the ten digits in raised figures on their circumference, with various contrivances for making the first disc describe one-tenth of a revolution after every figure is printed, for making the second disc describe one-tenth of a revolution every time the first makes a complete revolution, and so on, as well as for supplying the figures with ink at each impression. Provision is also made for the printing of duplicate and alternate numbers if this is required.

Pago (pä'gō), an Austrian island in the Adriatic, on the coast of Dalmatia; area, 81 sq. miles. Pop. 6203.

Pagoda (pa-gō'da), the name given to Hindu and Buddhist temples. The temple proper is generally of pyramidal form, and of a number of stories, of great size and height, and embellished with extraordinary splendor. Connected with it may be various other structures, open courts, etc., the whole forming architecturally a very imposing group. Pagodas are numerous not only in Hindustan, but also in Burmah, Siam, and China. The statues in the temples are often of a colossal size.

Pagoda of Mohamalaipur.

Great Pagoda at Bhuvaneswar, Orissa, India.

Pago Pago, a harbor in the island of Tutuila, Samoa. One of the best harbors in the Pacific, it was ceded to the United States in 1872, and occupied in 1898 as a coaling and supply station. In the subsequent division of the Samoan Islands between Germany and the United States, Tutuila fell to the share of the latter.

Paguma (pa-gū'ma), a group of mammals, genus *Paradoxūrus*, family Viverridæ (civets and genets),

inhabiting Eastern Asia. The peculiar masked paguma (*P. larvātus*) has a white streak down the forehead and nose, and a white circle round the eyes, which give it the appearance of wearing an artificial mask.

Pagurus (pa-gū'rus), the genus of Crustaceans to which the hermit or soldier-crabs belong. See *Hermit-crab.*

Pahang (pä-häng'), a state on the east coast of the Malay Peninsula; area, 3500 sq. m.; pop. 20,000. By the treaty concluded between Great Britain and the Sultan of Pahang in 1888 the control of the foreign relations of that state was conveyed to the government of the Straits Settlements; and Pahang is now practically a dependency of that colony. It produces gold, lead, tin, gutta percha, rattans and dammar.

Pahlanpur (pä-lan-pör'), or PALAUPUR, a town of Bombay, British India, 80 miles N. W. of Ahmedabad. Pop. about 20,000.

Pahlavi. See *Persia, Language and Literature.*

Paignton (pān'tun), a coast town in Devon, England, on Tor Bay, 2 miles S. of Torquay, is a rapidly-growing watering-place, and has large manufactures of cider. Pop. 11,241.

Pain (pān), a distressing sensation of the body, resulting from particular impressions made on the extremities of the nerves and transmitted to the brain. Physical pain may be produced by various causes — by injuries to the organs in which the pain is localized; by a peculiar state of the brain and nerves; or by the sympathetic affection of an organ at some distance from that which has been injured. It is often of great service in aiding the physician at arriving at a correct diagnosis of a disease, and still more obviously in frequently being the only intimation which a patient has of the fact of there being a disease which demands a remedy.

Paine (pān), ROBERT TREAT, statesman, was born at Boston, Massachusetts, in 1731. He was a delegate to the Provincial and Continental congresses and a signer of the Declaration of Independence. He held the offices of attorney general of Massachusetts and judge of the Supreme Court of that state, displaying fine ability as a judge. He died in 1814.— His son, of the same name (1773–1811), engaged in literary pursuits and is best known for his two patriotic songs. *Rise, Columbia*, and *Adams and Liberty.*

Paine, ROBERT TREAT, fourth in descent from the above, was born at Boston in 1835; died in 1910. He became known as an active philanthropist, organizing workingmen's associations of various kinds, and being made president, in 1907, of the Associated Charities of Boston. He was also interested in Peace, Children's Aid, and other societies, and created and endowed a trust for charitable purposes, named the Robert Treat Paine Association.

Paine, THOMAS, political and deistical writer, born in 1737 at Thetford, England. In 1774 he emigrated to America, with a letter from Franklin. Paine threw himself heart and soul into the cause of the colonists, and his pamphlet entitled *Common Sense*, written to recommend the separation of the colonies from Great Britain, and his subsequent periodical called *The Crisis*, gave him, by their great effect on the public mind, a title to be considered one of the founders of American independence. In 1787 he returned to England, and in answer to Burke's *Reflections on the French Revolution* wrote his *Rights of Man.* A prosecution was commenced against him as the author of that work, but while the trial was pending he was chosen member of the national convention for the department of Calais, and, making his escape, set off for France, where his *Rights of Man* had gained him great popularity, and arrived there in September, 1792. On the trial of Louis XVI he voted against the sentence of death, proposing his imprisonment during the war and his banishment afterwards. This conduct offended the Jacobins, and towards the close of 1793 he was excluded from the convention, arrested, and committed to prison, where he lay for ten months, escaping the guillotine by an accident. Just before his confinement he had finished the first part of his work against revelation, entitled the *Age of Reason;* it was published in London and Paris in 1794, by which step he forfeited the countenance of the greater part of his American connections. He remained in France till August, 1802, when he embarked for America, where he spent the remainder of his life, occupied with financial questions and mechanical inventions. He died at New York in 1809.

Painesville (pānz'vil), capital of Lake County, Ohio, is situated on Grand River, 3 miles from Lake Erie, and 29 miles E. N. E. of Cleveland. It possesses machine shops, sash and blind factories, foundries, flour mills, large nurseries, and various other manufactories. Pop. 5501.

Painter's Colic. See *Lead Poisoning.*

Painting (pānt'ing) is the art of representing the external facts of and objects in nature by means of color. A study of the art requires a knowledge of form, animate and inanimate; of perspective; and of light and shade. Considered in relation to the subjects treated, painting may be divided into decorative, historical, portrait, *genre* (scenes of common or domestic life), landscape (with seascape), architectural, and still life. According to the methods employed in the practice of the art it is termed oil, water-color, fresco, tempera or distemper, and enamel painting, and in mosaics, on glass, porcelain, terra cotta, and ivory (this last being called miniature-painting). Decorative works, usually in fresco or tempera, but sometimes in oil, are generally executed upon the parts of a building. For the basis of easel pictures, wood-panels prepared with a coating of size and white were used solely up to the 14th century for both oil and tempera, and are still sparingly employed; but canvas covered with a priming of size and white lead, and tightly nailed over a wooden frame called a 'stretcher,' is now almost universally adopted for oil-painting. For water-colors paper alone is employed. The tools used by an artist are charcoal, colored crayons, and lead pencils for outline purposes; colors, a palette for holding the same, a palette knife for mixing them; brushes for laying them on; and an easel with adjustable heights for holding the canvas. A wooden manikin, with movable joints, and termed a 'lay-figure,' is sometimes used on which to arrange costumes and draperies.

The term 'oil-colors' is employed to denominate colors ground with oil, and water-colors those wherein gum and glycerine have been employed. Both are ground solid, an oil medium being used in the first case and water in the second to thin out the colors when on the palette. Fresco-painting is executed on wet plaster. Mosaic work is formed by small cubes of colored glass, called tesseræ, fixed in cement; in tempera the colors are mixed with white; in encaustic, wax is the medium employed; and in enamel the colors are fired. Egyptian, Greek, and early Roman paintings were executed in tempera; Byzantine art found its chief expression in mosaics, though tempera panels were executed; and early Christian art, up to and partly including the 14th century, adopted this last method. The vehicle employed in mixing the colors was a mixture of gum and white of egg, or the expressed juice of fig-tree shoots. The introduction of oil-painting was long attributed to the Van Eycks of Bruges (circa 1380–1441), but painting in oil is known to have been practiced at a much earlier period, and it is now generally held that the invention of the Van Eycks was the discovery of a drying vehicle with which to mix or thin their colors, in place of the slow-drying oil previously in use. This new vehicle was composed of a thickened linseed-oil mixed with a resinous varnish, and it was its introduction that effected so great a revolution in the art of painting. For an account of special methods of painting see articles *Fresco-painting*, *Mosaic*, *Tempera*, *Encaustic*, *Enameling*, etc.

History — Egypt and Greece.— The practice of painting extends back to remote ages. It comes first into notice among the Egyptians in the 19th century B.C., the most flourishing period being between 1400 B.C. and 525 B.C. With them the art was the offspring of religion, and was with sculpture, from which it cannot be separated, subordinate to architecture. The productions are found chiefly on the walls of tombs and temples, but also on mummy-cases and rolls of papyrus. They consist chiefly of the representation of public events, sacrificial observances, and the affairs of everyday life. The work is purely conventional in character, and was executed according to a strict canon of rules under the supervision of the priesthood. Both outline and color were arbitrarily fixed, the figures and objects being rendered in profile and painted in perfectly pure flat tints, with no light or shade. The colors used are very simple, but the effect is often very harmonious, and with a strong sense of decorative composition. Although art is the natural product of man's mind, and cannot be assigned any particular commencement, it is nevertheless doubtless that Egyptian art slightly influenced that of Asia Minor, and strongly so that of Greece, in which country the arts attained to the highest excellence. This is proved by the testimony of historians, for no specimens of true Greek paintings save those on vases have come down to us. In Greece, as in Egypt, painting and sculpture were the handmaids of architecture, the friezes, pediments, and statues of the temples being originally colored. The more celebrated of the Greek schools of painting were at Ægina, Sicyon, Corinth, and Athens; the chief masters being Cimon, Polygnotus, and Panœnus, who lived about the fifth century B.C. Apollodorus, same century, systematized a knowledge of light and shade, while Zeuxis and Parrhasius directed their efforts to the per-

fecting of an ideal human form. Timanthes, a tragic painter, lived in the next generation; and at the time of Alexander the Great appeared Apelles (350 B.C.), the greatest of all Greek portrait painters, and Protogenes, an animal painter. With the death of these two painters decline set in, and Greek art gave itself up to the pursuit of trifling and unworthy subjects. Greek painting seems to have been, in truth of effect and in light and shade, in no way inferior to work of the present day, although perspective as a science does not seem to have been practiced.

Rome never had in ancient times an art that was indigenous, or produced a painter worthy of note. The conquest of Greece by the Romans brought an influx of Greek artists into Italy, and it was with their hands that the principal works of Roman art were produced. A number of specimens of ancient paintings have been discovered in the tombs and baths of Rome, at Pompeii, and at other places in Italy, chiefly in fresco and mosaic. Judging from these remains, which are known to have been produced when art was in a state of decadence, the ancients would seem to have possessed a great knowledge of the human figure, of animals, and of inanimate nature, and of their uses in art. Their skill as decorators has scarcely been surpassed. Their colors were used pure, with a just treatment of light and shade, and the knowledge of perspective shown is true, but limited in extent. During the first three centuries after Christ painting under the new influence of Christianity was practiced secretly in the catacombs under and around Rome. But with the establishment of Christianity by Constantine as the religion of the state, pagan art received its deathblow. Christian art was permitted to emerge, and was allowed to adorn its own churches in its own way. Mosaics, missal paintings, and a few panels are all that are left to us of this period. Notwithstanding the efforts made by several of the popes to encourage its growth by withdrawing certain limitations, especially as regards the use of the human figure, art sank lower and lower, until with the flood of barbarism which in the 7th century buried Italian civilization, the art of Christian Rome was practically extinguished.

Byzantium.— Meanwhile, with the foundation of Byzantium by Constantine in 330 A.D., a Byzantine school of art had been steadily growing up. As to style, it manifested the old Greek ideals modified by Christianity, and had reached its highest point about the time that Roman art was at its lowest. At Byzantium, art had become Christian sooner and more entirely than at Rome. Like the art of ancient Egypt, however, it had grown, under the strict influence of the priesthood, mechanical and conventional, but was yet strong enough to send artists and teachers through Southern Europe. Their works are still to be seen at Ravenna, in Rome, in Palermo, and more especially in the church of St. Mark at Venice (tenth century A.D.). All the Byzantine decorations are in mosaic, and are noteworthy for the splendor of their gilded backgrounds and for their grandeur of conception, though the figure drawing is weak, with no attempt at pure beauty. The Byzantine school was thus the immediate parent of the great schools of Italy, and of the Rhenish or old Cologne school in Germany.

Italy, Early Period.— The Italian painters could not, however, at once free themselves from the Byzantine tradition which compelled one painter to follow in the steps of his predecessor without referring to nature; and so this style was carried on in Italy by Byzantine artists and their Italian imitators up to the middle of the 13th century. The breaking through of this tradition and the great progress made by the arts in the 13th century form part of a movement which has been termed the Renaissance or Revival, the arts being no longer representative merely, as heretofore, but becoming imitative.

Three cities of Italy, namely, Siena, Pisa, and Florence, share the honors of this revival, each boasting a school and each possessing two or three great names and their consequent followers. The first regenerators were Guido of Siena, Giunta of Pisa, and Margaritone of Arezzo, whose works, though ugly and almost barbarous, yet show a departure from the stiffness of Byzantine tradition. Giovanni Cimabue, born at Florence in 1240, may, however, be said to be the father of modern painting, and was the first fairly to free himself from traditional models; his works and those of his predecessors just named forming the transition from the Byzantine to the modern manner. His appearance marks an era in history, and after him come two painters, the one at Siena and the other at Florence, in each of whom appears the power of deriving an impression direct from nature. These were Duccio di Buoninsegna (1260–1320), whose masterpiece is still at Siena, and Giotto (1266–1337), a pupil and protégé of Cimabue, and of whose works examples are still to be seen in Florence, at Assisi,

and at Padua. Of these two, Giotto is by far the greater, and his immediate pupils and their successors constituted a school which exercised an influence throughout Italy. The rival school of Siena produced Simone Memmi (1284–1344), but died out owing to its exclusiveness. The works of all the artists of these two schools were executed either in fresco or in tempera, and although lacking in chiaroscuro and deficient in perspective, compensated largely for these defects by an earnestness, a devotion, and a spiritual significance which will for ever make the 14th century memorable in the history of art. No other schools worthy of note existed elsewhere in Italy during this century; neither could the Flemish or the German school be said to have had any distinct existence as such.

With the 15th century came the introduction of oil-painting, and with it an all-round improvement both in knowledge of technics and power of expression. To the earlier half of this century belong the great masters of religious art, the most noteworthy being Fra Angelico (1387–1455), who worked chiefly in Florence, and whose productions are full of the peculiar religious fervor characteristic of the painter. A knowledge of the exact sciences as applied to art gave an added impulse, and Paolo Uccelli (1396–1475) and Piero della Francesca (1415–92) divide the honor belonging to the perfecting of a system of perspective. The works of Masolino da Panicale (died 1420) show the greatest advance yet made in the direction of chiaroscuro. Masaccio (1401–28), by his knowledge of the figure and by his treatment of groups with their proper force of light and shade and relief in appropriate surroundings, became the founder of the modern style. Andrea Verrochio (1432–88), the master of Leonardo da Vinci, promoted a knowledge of anatomy, and Ghirlandajo (1449–98), the master of Michael Angelo, may also be mentioned, both as a goldsmith and as a painter. These painters all belong to the Florentine school; but other schools were coexistent, notably that of Padua founded by Squarcione (1394–1474), whose pupil was Andrea Mategna (1431–1506), an artist who takes rank among the greatest masters of painting. The Venetian school also arose under the influence of the Bellini, Giovanni (1427–1516) and his brother Gentile (1429–1507), whose works, though somewhat hard and somewhat dry in texture, yet in color anticipate the great works of their pupils. The Umbrian school produced Pietro Perugino (1446–1524), a painter of the first rank and the master of Raphael. The Neapolitan school also began to be heard of. The Italian art work of the 15th century by its unconsciousness and spiritual meaning excelled much of that which was to follow. The latter, though carried to the highest pitch of perfection, lost much of the freshness and spontaneity possessed by the art of the earlier century.

Netherlands, Early Period.— Before speaking of the 16th century it were well to look elsewhere in Europe, and especially at the Netherlands, from whence had come the invention of oil painting, which so completely revolutionized technical methods. This discovery was made by the brothers Hubert and Jan Van Eyck, of Bruges, about the commencement of the 15th century, and carried to Italy by Antonello da Messina (1445–93). The greatest follower of this school was Hans Memling (1450–99), a comparison of whose works with those of his Italian contemporaries shows an excellence of technic and a power of expression not always in favor of the southern artists. Quentin Matsys, of Antwerp, (1460–1529) should also be mentioned as belonging to this school, a school which further exercised an influence upon that of Germany, with a result apparent in the next century, and was also the means of founding a school in Holland.

Italy, Germany, 16th Century.— The work of the 16th century is centered as much upon particular men as upon schools. Though many of the painters hereafter named were born in the latter half of the 15th century, their work separates itself so distinctly from that of their predecessors that it is the custom to consider it as belonging to the latter period. The four great schools were at Florence, Rome, Parma, and Venice, and each furnished from its scholars a painter who was in himself the particular glory of his school. Heading the Florentine comes Leonardo da Vinci (1452–1519), who established himself at Milan, and was celebrated as a painter, sculptor, architect, and engineer, his chief pupil being Bernardino Luini (1470–1530). Then following no man's style, but coming as a creator, we have Michael Angelo (1475–1564), combining in himself the highest powers in architecture, sculpture, and painting. He was followed in Florence by Fra Bartolommeo (1475–1517) and Andrea del Sarto (1488–1531). The Roman school, not indigenous but a continuation of the Umbrian school before mentioned, centers itself round the third great name, that of Raphael Sanzio

(1483–1520), aptly called the prince of painters, who with his pupils and assistants, the chief among them being Giulio Romano, constitute the Roman school. Parma contains the work of Correggio (1494–1534), generally known as the head of the Lombard school, an artist unrivaled for grace, and harmony of chiaroscuro. Finally, Venice produced a school supreme in respect of color, and owing such power as it possesses entirely to the influence of the Bellini. The first name in this period is Giorgione (1476–1511); then comes Titian (1477–1576), who takes rank with the great masters of the Florentine and Roman schools; followed by Tintoretto (1512–94) and Paolo Veronese (1532–88), who with Titian stand for all that is greatest in this school. However, it further produced Jacopo Bassano (1510–92), noted as the first to introduce pure landscape into his backgrounds; and Paris Bordone (1500–71), noted for his power in coloring and brilliancy of effect. In the north the Flemish school had become rapidly Italianized, with a result best seen in the following century. In Germany the influence of the Flemish school had made itself felt, and had produced in Albert Dürer, of Nuremberg, (1471–1528) the most celebrated master of his time north of the Alps. With him are associated Lucas Cranach (1472–1553), Burgkmair (1474–1559), and Albrecht Altdorfer (1486–1538).

Italy, Holland, etc., 17th Century.— The 16th century consummates the great age of modern art, an age that might justly be said to equal any period of Greek art. With the 17th century came the decline, brought about chiefly by the slavish imitation of the great painters of the preceding period, and art was only saved from extinction by a reaction headed by the Caracci. Their school, known as the Eclectic, was founded at Bologna by Ludovico (1555–1619), Agostino (1557–1607), and Annibale (1560–1609). Their principle was to unite a direct study of nature with a study of the excellencies of the great masters. To a certain extent the object was attained, and Guido Reni (1574–1642), Albani (1578–1660), and Domenichino (1581–1641) best illustrate in their works the results arrived at. Side by side with this school grew up that of the Naturalists at Naples, founded by Caravaggio (1569–1609), and having as his pupil Spagnoletto (1588–1656), who in turn taught Salvator Rosa (1615–73). Pietro da Cortona (1596–1669), the last of the Roman school, was the opponent of the Eclectic style. With the later Venetian school, which count Canaletto (1697–1768) and Tiepolo (1693–1770) among its disciples, the art of Italy may be said to have ended. Its seed spread itself and took root in France, and especially in Flanders, where Rubens (1577–1640) had become its greatest exponent, and whose pupils Jordaens (1594–1678) and Vandyck (1599–1641) were the most noteworthy artists of this school. In Holland, however, art had acquired a distinct individuality, first in Franz Hals (1584–1642) and above all in its typical painter Rembrandt (1607–69), both portrait painters distinguished for their portrait groups; also by its landscape and *genre* painters, of which two classes of subjects this school is the great exponent. Among its landscape painters are Van de Velde, Ruysdael, Hobbema, and Cuyp; and among its *genre* painters are Gerard Dow, Breughel, Teniers, and Van Ostade. The Spanish school, which stands alone in the prevailing religious ascetic character of its productions, and which in the preceding centuries had been influenced by Flemish and Italian painters, reached its greatest epoch in this century with Velasquez (1599–1660), one of the greatest of portrait painters, Murillo (1613–80); and with these may be mentioned Zurbaran (1598–1662), and Cano (1601–67).

France, 16th–19th Century.— The effect of Italian art in France remains to be noted. The school of France, influenced at first both by Flemish and by Italian art, finally inclined to the latter, and in the reign of Francis I (1515–47) a school was established at Fontainebleau and called by that name. Leonardo da Vinci worked in France, and Primaticcio carried on the unfinished work of Rosso (died 1541). Jean Cousin (1501–89) may be called the founder of the French school as opposed to the Italianized version which began with Simon Vouet (1590–1649). The native school was, however, finally overcome by the Italian method. Nicholas Poussin (1594–1665), figure and landscape painter, one of the greatest painters France can claim; Claude Lorraine (1600–82) and Gasper Dughet or Poussin (1613–75), landscapists, are painters who, though born in France, yet worked in Italy, and stand apart from the followers of the then national style; as does also Eustache Lesueur (1617–55), sometimes called the French Raphael. This national style was coeval with the court of Louis XIV and representative of it, the chief exponents being Le Brun (1619–90), Mignard (1610–96), Du Fresnoy (1611–65), and Jouvenet (1644–1711). To

continue the history into the 18th century, with France we find a steady deterioration both in technic and morality; the latter phase commenced by Watteau and Lancret, two painters truly French, and consummated by Boucher (1704–70). Greuze (1725–1805) and Vien (1716–1809) were the first to protest against the corrupt influence of Boucher, and were the precursors of the reform, of which David (1748–1825) was the great instigator, a man whose influence made itself felt throughout Europe. He insisted upon a return to the study of the antique, and his followers number a few distinguished men, notably Gros and Guerin. Géricault (1774–1829), a pupil of Guerin, was the first to break with the extreme classicism of the school of David, and Ingres (1780–1867), Delacroix (1798–1863), Scheffer (1795–1858), and Delaroche, noted for the reality of his historical subjects and the tenderness and pathos of his sacred pictures, (1797–1856) are the most distinguished names of the more direct and romantic style initiated by him. Modern French landscape art, founded upon an impulse received from England, has had Decamps (1803–66), Rousseau (1812–67), Corot (1796–1875), and Millet (1815–75) as its chief exponents. The work of Regnault (1843–71) remarkably illustrates the tendencies of modern French painting. Bastien Lepage (1848–84), with his literal renderings of nature, strongly influences the younger British school; and Meissonier (1815–91), Gérôme (1824–1904), Bouguereau (1825–1905), Constans, and Cabanel, and Puvis de Chavannes as a decorative artist, are some of the chief members of a school which is at the present time influencing the art of the world.

Germany, Holland, etc., 19th Century. — Germany during the 18th century remained stationary in matters of art, but with the revival in France came a similar but slightly later movement in Germany, the precursors of which were Holzer (1709–40), a Tyrolese fresco painter, and Carstens (1754–98). The chief of the revivalists, however, was Overbeck (1789–1869), who, with a band of followers, founded a school at Rome in 1810, the principle animating whose work was that modern artists should only study the painters of the time preceding Raphael. Overbeck painted religious subjects, and worked both in fresco and oil. His works, while possessing fine feeling, are poor in color and weak in chiaroscuro. Chief among his pupils is Cornelius (1783–1867), one of the greatest of modern German painters, and whose work is best seen in Munich. Schadow (1789–1862) was a pupil of Cornelius. Schnorr von Carolsfeld (1794–1872) chose for his subjects the mediæval history and myths of Germany, and also produced an extensive series of illustrations of the Bible of great merit. Kaulbach (1805–74), a great historical painter and pupil of Cornelius, shows in his work some of the worst faults of the modern German school. Lessing (1808–80) is famous both for his historical and landscape pictures, and among modern painters worthy of note are Gabriel Max and Menzel, in historical; Knaus Vautier, Metzler, and Bochmann, in genre; and Achenbach in landscape. In Dutch art of the present day the same taste but not the same power of execution prevails as in earlier times. Sea-pieces, landscapes, scenes of common life are still the chief subjects selected. Schotel and Scholfhart have distinguished themselves as landscape-painters, Van Os, Van Stry, and Ommeganck as cattle and figure painters, whilst Josef Israels, a painter of domestic scenes, with M. Maris and Mesdag, are living artists. The influence of the French school is at present paramount in Belgium, as was the classicism introduced by David up to 1830. At that time a reaction was begun by Leys (1815–69), and followed up by Wappers (1803–74), painters who selected historical subjects of national interest. The work of reformation continued to be carried on notably by Gallait and De Keyser; whilst the strong current of the present French influence may be seen in the works of the living artists Alfred Stevens and Verlat. In Italy after a long period of artificialness and mediocrity there are signs of revival in painting. Pio Joris and Cammarano have gained distinction as painters of history, and Alberto dall' Oro and Pallizzi as painters of landscape. Morbelli and Segantini show in their works some signs of a return to nature. Spain, too, with the exception of the works of Fortuny, remains unindividualistic; but a strong influence is now being exercised upon her by French art. Russian art, which had remained at a standstill since the Byzantine time, has since 1850 made great advances. It has produced Swedomsky, historical painter, Verestchagin, a traveler artist, and Kramskoë, a religious painter. Scandinavian art inclined for some time to the two schools of Düsseldorf and Paris, but has finally elected to follow the latter, several of her younger artists residing permanently there. Their choice is usually landscape, and among the chief names may be men-

tioned Normann Uhde and Edelfeldt. For painting in England see the article *English Art* and the paragraph below.

Great Britain, 18th and 19th Centuries. – The first to bring high art to England in the field of painting was Hans Holbein (1497–1534), an artist of German birth and training, though his works were principally produced in England during the reign of Henry VIII. Rubens and Vandyke, leaders in Flemish art, also did some work in England during the reign of Charles I, the latter spending all his later life in that country. There were other artists of note in the island kingdom during this early period, but for the development of a distinctive English school of painting we must come down to Sir Joshua Reynolds (1723–92), who is looked upon as the founder of the English school, and eminent as a colorist, excelling in portraiture. Gainsborough (1727–88), his contemporary, nearly approached him in portraits, and much excelled him in landscapes, being in this field an artist of great skill and excellence. Another eminent painter of this period was Hogarth (1697–1764), whose works were powerful satires on the manners, morals, and follies of the age. Among the contemporaries of these artists may be named Fuseli, the 'Dante' of painters; Wilson, eminent in landscapes; Romnie and Opie, able delineators of woman's beauty, and Barry, famous for his historical subjects. The nineteenth century yielded a prolific harvest of painters, the first to achieve fame being Sir Thomas Lawrence (1769–1830), highly distinguished for his rare delineation of female faces. Rivals of his in this field were Hoppner, Jackson, and Raeburn. Sir David Wilkie (1785–1841), a Scotch painter, has never been surpassed in Britain in his delineations of humble life. In poetic landscape Turner (1775–1851) stands first, his works being of the highest excellence in their particular field. Constable (1776–1837) was also distinguished in landscape, and among the others of this period may be named Haydon, an historical painter of high merit; Etty, a splendid colorist; Calcott, Collins, Nasmyth, and Morland. *Genre* painting was cultivated by Birk, Stothard, and others, succeeded at a later date by Newton, Leslie, Cooper, Madise, Eastlake, Hamilton, Cope, Dyce, Landseer, Frith, Faed, etc., most of these also painting landscape and historical subjects. Landscape was also cultivated by Baddington, Linnell, Roberts, etc. Lance won fame for his pictures of still life, Stanfield for his splendid sea pieces, Landseer, Audsell, and Herring for animal subjects, and many others in special fields. An interesting feature of the period was the development of a new school of art, called the *Pre-Raphaelite*, its leading representatives being Holman Hunt, Dante G. Rossetti, John E. Millais, and Burne-Jones. These are only a few of leading position among the multitude who have produced creditable works of art in the British school. To the names given we may add those of Hall, Herkimer, Leighton, Poynter, Forbes, Lawson, Fildes, Parsons, and Moore.

In the United States painting had but slow development until a comparatively recent date. The troublous times of colonial settlement and the Revolution were not conducive to art culture, although even then America had produced artists of merit — Benjamin West (1738–1820), who was made president of the Royal Academy of England; Copley (1737–1815), of high rank as portrait painter; Stuart (1756–1828), also ranking high in portraiture; Leslie (1794–1859), *genre* painter; Trumbull (1756–1843), historical; and Allston (1779–1843), the first really distinctive American artist. Thomas Cole (1801–48) originated the American school of landscape painting; his pictures are lovely and loving reproductions of nature; his worthy follower was Thomas Doughty. Others of this period were Inman, the first successful American master of *genre*, and Durand, who excelled in landscape, while Jarvis and Sully were noted portrait painters, and Vanderlyn ably painted historical subjects. Coming to a later date, we can mention only a few of the leaders in art. In the fields of history and *genre* may be found Rothermel, Page, Johnson, Homer, Leutze, Weir, May, Powell, Darley, Lambdin, Hennessey, Freeman, La Farge, Elihu Vedder, Huntington, and Reid; in marine subjects, Bradford, Dana, De Haas, Dix, Hamilton, Haseltine, Moran; landscape has Church, Bierstadt, Kensett, Inness, Hart, Cropsey, Casilear, Gignoux, Wyant, the Giffords, Cranch, Griswold, Bristol, Brown, Fitch, Richards, etc. In portrait painting Whistler and Sargent attained world fame, and Abbey, though chiefly celebrated as an illustrator, has executed some remarkable works in color. In the field of landscape painting modern artists have made notable progress.

Paisiello (pa-i-si-el'lō), GIOVANNI, an Italian singer and musician, born in 1741. In 1763 his first opera (*La Pupilla*) was performed with great applause at Bologna. By the year 1776 he had composed nearly fifty operas. In Russia he composed his best produc-

tions, *La Serva Padrona* and *Il Barbiere di Seviglia*, and in Vienna *Il Rè Teodoro*, and twelve symphonies for the Emperor Joseph II. He died in 1816.

Paisley (pāz'li), a burgh of Scotland, in the county of Renfrew, 7 miles W. S. W. of Glasgow. It consists of an old town on the west or left, and a new town on the east or right bank of the river, communicating by three handsome bridges. The most noteworthy building is the Abbey Church, now a parish church, belonging to a monastery (of which little else now remains) founded in 1163 by Walter, son of Alan, the first of the house of the Stewarts, and at one time a very opulent foundation. In St. Mirren's Chapel or the Sounding Aisle, on the south side, stands a tomb supposed to have been built in honor of Bruce's daughter Marjory. Paisley has been long noted for its manufactures, especially of textile goods. The shawl manufacture, introduced about the beginning of the 19th century, and long a flourishing industry, is not now a staple, but the textile manufacture is still large, and to it has been added that of sewing cotton, for which Paisley is celebrated all over the world. Wilson the ornithologist, the poet Tannahill, and Prof. Wilson (Christopher North) were natives of Paisley, which possesses a bronze statue of the ornithologist and of the poet. Paisley is a town of ancient origin, having been at one time a Roman station under the name of *Vanduara*. Pop. 79,363.

Pajamas (pa-ja'maz), loose trousers worn by both sexes in India, a modification of which is now largely used for chamber wear in America and Europe.

Paladin (pal'a-din), a term originally applied to the *Comes palatii*, Count of the Palace, or Count Palatine, the official who superintended the household of the Carlovingian sovereigns, and then to the companions in arms of Charlemagne, who belonged to his court. Latterly it was used in a more general sense.

Palæarctic Region (pa-lē-ark'-tik), in zoology, one of six divisions of the world based upon their characteristic fauna. It embraces Europe, Northern Asia, and Africa north of the Atlas range.

Palæichthyes (pa-lē-ik'thi-ēz), a division of fishes comprising the Ganoidei and the Elasmobranchii.

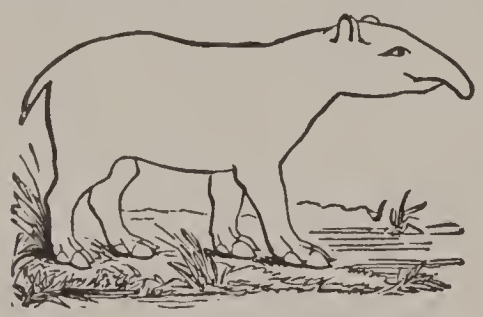
Palæography (pa-lē-og'ra-fi; Gr. *palaios*, ancient, and *graphē*, writing) is the science by means of which ancient inscriptions, and the writings and figures on ancient monuments, are deciphered and explained; as distinguished from *diplomatics*, which deals with written documents.

Palæologi (pa-lē-ol'ō-ji), the name of the sovereigns of the last dynasty of the Byzantine Empire. The founder of the dynasty was Michael Palæologus, who in 1260 became Emperor of Nicæa, and in 1261 Emperor of Byzantium. See *Byzantine Empire*.

Palæontology (pa-lē-on-tol'ō-ji; Greek, *palaios*, ancient; *onta*, beings) is the science which treats of the living beings, whether animal or vegetable, that have inhabited the globe in the successive periods of its past history. The comparison of the fossil remains of plants and animals, belonging for the most part to extinct species, has given a powerful impulse to the science of comparative anatomy, and through it a truer insight has been obtained into the natural arrangement and subdivision of the classes of animals. But the science which has profited in the highest degree from palæontology is geology. Palæontology, apart from its importance as treating of the past life-history of the earth, assists the geologist in his determination of the chronological succession of the materials composing the earth's crust. As a general result of united geological and palæontological researches, it has been found possible to divide the entire series of stratified deposits into a number of rock-systems or formations, each of which is defined by possessing an assemblage of organic remains which are not associated in any other formation. These systems as a whole are divided into three great divisions, based on the characters of their organic remains, and thus representing three successive life-periods, as follows:—*Palæozoic*, or ancient life epoch, which includes the Laurentian, Cambrian, Silurian, Devonian, Old Red Sandstone, Carboniferous, and Permian rock systems. *Mesozoic*, or middle life epoch, including the Triassic, Jurassic or Oolitic, and Cretaceous rock systems. *Cainozoic*, or recent life epoch, which comprises the Eocene, Miocene, Pliocene, and Post-tertiary rock systems. The fossil remains of the first two divisions belong almost wholly to extinct genera. The Cainozoic fossils belong largely to living genera, or genera only recently extinct. See *Geology*.

Palæotherium (pa-lē-ō-thē'ri-um), an extinct genus of Ungulate or Hoofed Quadrupeds with three toes. These animals resembled tapirs, and varied in size from a sheep to a horse. They had twenty-two teeth

in each jaw, and, in all probability, a short mobile snout or proboscis. This genus forms the type of the family Palæ-



Palæotherium restored.

otheridæ, which occur as fossils in Eocene and Miocene strata. *P. magnum* is a familiar species.

Palæozoic. See *Palæontology.*

Palæstra (pa-lē'stra), originally in Greece a place for wrestling, afterwards a place for training the athletes who contended in the public games.

Palais-Royal (på-lā-rwå-ål), a popular resort of the Parisians, originally a royal palace, as the name implies. The original palace was built (1629–36) by Richelieu, and by him presented to Louis XIII. It was confiscated by the republicans in 1793, and the Tribunal sat in the palace during the Reign of Terror. At the Restoration it was repurchased by the Duke of Orleans, but in the revolution of 1848 it was again appropriated to the state. In 1871 it was set on fire by the Communists, but has since been restored. The Théâtre Français and several shops now form parts of the buildings of the Palais-Royal.

Palamedea (pa-la-mē'de-a), a genus of S. American birds. *P. cornūta*, the horned screamer (which see), is the typical species.

Palamkotta (pä-läm-kot'tä), town of India in Tinnevelli district, Madras Presidency, 3 miles E. of Tinnevelli. Pop. 39,545.

Palanpur. See *Pahlanpur.*

Palanquin, PALANKEEN (pal-an-kēn'), a covered conveyance used in India, China, etc., borne by poles on the shoulders of men, and in which a single person is carried from place to place. The palanquin proper is a sort of box about 8 feet long, 4 feet wide, and as much in height, with wooden shutters on the Venetian-blind principle. It used to be a very common conveyance in India, especially among the Europeans, but the introduction of railways and the

Palanquin.

improvement of the roads have almost caused its discontinuance.

Palatals (pal'-a-talz), sounds which derive their character from the conjunction of the tongue and hard palate, as *ch* in *church.*

Palate (pal'at), the name applied to the roof of the mouth. It consists of two portions, the *hard* palate in front, the *soft* palate behind. The former is bounded above by the palatal bones, in front and at the sides by the alveolar arches and gums, being lined by mucous membrane; behind it is continuous with the soft palate. It supports the tongue in eating, speaking, and swallowing. The *soft palate* is a movable fold suspended from the posterior border of the hard palate. It consists of mucous membranes, nerves, and muscles, and forms a sort of partition between the mouth and the hinder nostrils. Its upper border is attached to the posterior margin of the hard palate; its lower border is free. The *uvula* hangs from the middle of its lower border, and on each side are two curved folds of mucous membrane called the *arches* or *pillars* of the *soft* palate. Between these on either side of the pharynx are the two glandular bodies known as *tonsils.* The upper surface of the soft palate is convex, the lower surface is concave with a median ridge, the latter pointing to the early or embryo stage of its formation, when it consists of two distinct parts. Non-union of these halves and of those of the hard palate constitutes the deformity known as *cleft palate*, often associated with harelip. Glands are abundant in the soft palate, secreting the mucus which serves to lubricate the throat during the passage of food. The soft palate comes into action in swallowing, and also in speaking, being of great importance in the utterance of certain sounds. The special use of the uvula is not well

known. It is often relaxed or enlarged, causing a troublesome cough.

Palatinate (pa-lat'i-nāt; German PFALZ), a division of the old German Empire, under the rule of counts-palatine (Pfalzgrafen), consisting of two separate portions distinguished as the Upper and Lower Palatinate. The Upper or Bavarian Palatinate was bounded mainly by Bohemia and Bavaria, and its capital was Amberg. The Lower or Rhenish Palatinate lay on both sides of the Rhine, surrounded by Baden, Alsace, Lorraine, etc., its chief towns being Heidelberg and Mannheim. The counts-palatine were in possession of the Palatinate and the districts belonging to it as early as the 11th century, and were long among the most powerful princes of the German Empire. At the Peace of Westphalia (1648) the Lower Palatinate was separated from the Upper, Bavaria getting the latter, while the former now became a separate electorate of the empire, and was henceforth generally known as *the* Palatinate. By the treaties of Paris (1814–15) the Palatinate was split up; Bavaria received the largest part, and the remainder was divided between Hesse-Darmstadt and Prussia. The name Palatinate now belongs to the detached portion of Bavaria on the west of the Rhine, while the Upper Palatinate forms another portion of the monarchy. See *Bavaria.*

Palatine. See *Palatinate* and *Count Palatine.*

Palatine Hill. See *Rome.*

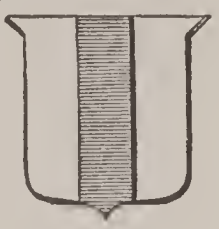
Palatka (pa-lat'ka), a port and city of Florida, capital of Putnam Co., on the western bank of the St. John's River, 50 miles from the sea. It is frequented by deep-sea as well as by river steamers, and has a trade in oranges, sugar, and cotton, small fruits and vegetables, and has iron and machine works. Pop. 3779.

Palawan (pa-lä'wan), an island on the northeast of Borneo, belonging to the Philippines; area, 4576 square miles. It is mountainous, well wooded and watered, and very fertile, but unhealthy. Pop. (chiefly Malays), about 30,000.

Palay (pa-lā'), an Indian climbing plant (*Cryptostegia grandiflora*) of the nat. order Asclepiadaceæ. Its stalk-fibers, which are strong and white, are spun into a very fine yarn; and its milky juice forms a kind of caoutchouc.

Palazzolo (pa-lät'sō-lō), a city of Sicily, 28 miles west of Syracuse. Here are the ruins of the ancient city of Acrae, founded by Syracuse, 663 B.C., where curious remains are still to be seen. Pop. 14,840.

Pale (pāl), in heraldry, the first and simplest kind of ordinary. It is bounded by two vertical lines at equal distances from the sides of the escutcheon, of which it encloses one-third. See *Heraldry.*



A pale azure

Pale, THE, or the ENGLISH PALE, a name formerly given to that part of Ireland which was completely under English rule, in distinction from the parts where the old Irish laws and customs prevailed.

Paleæ (pā'le-ē), in botany, the bracts that are stationed upon the receptacle of Compositæ between the florets; also interior bracts of the flowers or grasses.

Palembang (pä-lem-bäng'), a town of Sumatra, capital of the province of same name, on the Moosi, here called the Palembang. There are about 60,000 inhabitants, partly inhabiting houses raised on posts, and partly living on rafts moored in the river. Its port is one of the best in the Malay Archipelago.

Palencia (pä-lān'thē-ä), a town of Spain in Leon, capital of a province of same name, situated on the Carrion, an affluent of the Pisuerga. It is a bishop's see, and has a fine Gothic cathedral. Pop. 15,940.—The province of Palencia is fertile and watered by the Carrion and Pisuerga. Area, 3256 square miles; pop. 192,473.

Palenque (pä-len'kā), a village of Mexico, state of Chiapas, 60 miles N.E. of Ciudad Real. About 7 miles S.W. of it are some of the most extensive and magnificent ruins in America, belonging to the period anterior to the Spanish conquest. The principal of these, called the 'palace,' is 220 feet long by 180 feet wide, with numerous sculptures and hieroglyphics.

Palermo (pä-lėr'mō; ancient *Panormus*), a seaport town, the capital of Sicily, beautifully situated on the north side of the island. It is built in the form of an amphitheater facing the sea, and is surrounded by walls. The city is ornamented by numerous fountains, and has many public edifices, including a cathedral of the tenth century which contains monuments in porphyry of the Emperor Frederick II and King Roger the Norman. Other notable buildings are the churches of St. Peter and St. Dominic; a royal palace of Saracenic origin, containing the chapel of King Roger; the Cap-

pella Palatina (Palatine Chapel), built in a mixed Saracenic and Norman style, and dating prior to 1132, having the walls entirely covered with rich Byzantine mosaics on a golden ground; the picture gallery and the armory; the National Museum, containing some of the oldest monuments of Greek plastic art to which a definite date can be assigned (sixth century B. C.); the archiepiscopal palace, the custom-house, the university, three theaters, and numerous other structures of architectural interest. The port is enclosed by a mole 1300 feet in length. Palermo is the residence of the military commandant of the island, and has an arsenal and shipbuilding yards. The manufactures consist chiefly of silks, cottons, oilcloth, leather, glass, and gloves. The principal exports are sumach, wine and spirits, fruits, sulphur, skins, oil, essences, cream of tartar, liquorice, and manna; imports, colonial produce, woolen, cotton and silk tissues, hardware, earthenware, etc. The fisheries are very productive, and give employment to nearly 40,000 hands. Palermo was probably founded by the Phœnicians; it afterwards became the capital of the Carthaginian possessions in Sicily. It was taken by the Romans, 254 B.C. The Saracens held it for a time, and in 1072 it fell to the Normans. The German emperors and the French subsequently held it, and since the Sicilian Vespers (1282) it has shared the fortunes of the Sicilian kingdom. The court of Naples resided here from 1806 to 1815. Garibaldi captured the town in 1860. Pop. 264,036.—The province of Palermo contains an area of 1963 square miles. Pop. 785,357.

Pales (pā'lēz), the goddess (sometimes regarded as a god) of sheepfolds and pastures among the Romans. Her festivals, called *Palilia*, were celebrated on the same day as the anniversary of the founding of Rome.

Palestine (pal'es-tīn), CANAAN, or the HOLY LAND, a maritime country of Asiatic Turkey, in the southwest of Syria, having on the north the mountains of Lebanon and Anti-Lebanon, east the Arabian Desert, south Arabia, and west the Mediterranean; length, north to south, about 140 miles; breadth, about 80 miles; area, nearly 10,000 square miles (or one-third the size of Scotland). The coast has no indentations except the Bay of Acre in the north. The chief feature of the interior, besides its generally irregular character, is the deep valley of the Jordan, a river which intersects the country from the north to south, and connects three lakes, the Dead Sea, Lake of Gennesaret, and Lake Merom. The surface is generally mountainous, or consists of a series of plateaux both on the west and the east of the valley of the Jordan. With the exception of Mount Hermon in the north (9050 feet) few of the heights exceed 3000 feet. The most remarkable are Carmel, on the southwest side of the Bay of Acre; Jebel Tur (Tabor), farther inland; Ebal and Gerizim, about the middle of the country; Zion, Moriah, and the Mount of Olives, in and near Jerusalem. Palestine has comparatively few plains, though in few countries is there such endless variety of valley as to size, shape, color, and fertility. The maritime or coast plains of Sharon and Philistia, the river plain of Jordan, and the plain of Esdraelon in the north, are all that are worthy of mention. The maritime plains are well peopled and cultivated. The Jordan plain is nearly a waste of sand. The plain of Esdraelon or valley of Jezreel is of great fertility. The principal river is the Jordan (which see). This river has a length of 200 miles, including windings, but its direct course is only about 70. Its course from Merom to the Dead Sea is mostly below the sea-level. Most of the so-called rivers of Palestine are merely winter torrents which run dry in summer. Of the few permanent rivers emptying into the Mediterranean, the most important are the Kishon, which drains the plain of Esdraelon; and the Aujeh farther south. The chief tributary of the Jordan is the Zerka or Jabbok. The most remarkable lake is the Dead Sea (which see), 46 miles long, 9 or 10 broad, and fully 1300 feet below the Mediterranean. The other lakes are Bahr-el-Huleh (Merom), 5 miles long and 4 miles broad, about 6 feet above the Mediterranean; and Lake Gennesaret or the Sea of Galilee, 682 feet below it, 12½ miles long 7½ broad. In Palestine the wells and springs are numerous, and are all counted worthy of note. Among the most interesting are the springs of hot water which issue forth on both sides of the Jordan valley. Of these there are five or six with a temperature varying from 103° to 144° F. As regards geology, the chief rock formation of the country on both sides of the Jordan is limestone, full of caves. Sandstone also occurs, with basalt and other volcanic rocks, the latter being especially common on the east side of Jordan. Signs of volcanic action are abundant, and earthquakes are still common. The year may be divided into two seasons, summer and winter. During the former, which lasts from April to November, little or no rain falls; during the latter there is a considerable fall of rain,

the annual average at Jerusalem being about 60 inches. In the Jordan valley and along the Mediterranean lowlands the summer heat is apt to be oppressive. During the winter the ground is seldom, if ever, frozen except on the higher elevations. Palestine was once very fertile, and were the same attention paid, as formerly, to artificial irrigation, and the construction of reservoirs and watercourses, it might be so again. Among the products, besides the usual cereals, are grapes, figs, olives, oranges, and apricots. The flora of Palestine is rich in flowering plants, including the scarlet anemone, ranunculus, narcissus, crocus, pheasant's-eye, etc. The country was once well timbered, but it is now, as a whole, bare and desolate, though forests of pine and oak exist on the east of the Jordan. On the west side of the river, however, there are few trees. The most common tree is the oak, including the prickly evergreen oak and two deciduous species. Other trees are the olive, palm, oleander, sycamore, walnut, ash, cedar. The wild animals include the leopard, hyæna, bear, wolf, jackal, boar, antelope, gazelle, porcupine, coney, jerboa, etc. The domestic animals of burden are the ass, mule, and camel, the horse being little used. The cattle are not generally very numerous. Sheep and goats are abundant. Among the birds are eagles, vultures, hawks — birds of prey being very numerous — ravens, bee-eaters, hoopoes, storks, and nightingales. Fish abound in the Sea of Galilee and the Jordan. There are many species of reptiles, among them being the chamæleon, land and water tortoise, lizards, and serpents, and even the crocodile.

The name Palestine, from the Hebrew *Peleścheth*, means the land of the Philistines. It is properly only applicable to the southwest part of the country. The ancient name of the country was Canaan, and when thus named, in the time of the patriarchs, it was parceled out among a number of independent tribes, all probably Semitic. In the time of Moses the district east of the Jordan was taken and divided among the tribes of Reuben and Gad, and the half-tribe of Manasseh; and later the whole territory was apportioned among the twelve Jewish tribes. For the subsequent history see the article *Jews*. In the time of our Saviour Palestine was held by the Romans, and divided into the four provinces of Galilee, Samaria, Judea, and Perea. In 606 Palestine was taken by the Saracens under Omar. The severities exercised towards Christians gave rise to the Crusades, but Mohammedanism remained in control, and the country sank into a degraded state. The Sultan of Egypt ruled it till 1517, when it was incorporated with the Turkish Empire.

It is only within a comparatively recent period that the exploration of Palestine has been carried out systematically and with some attempt at thoroughness, though much yet remains to be done. The most valuable results have been those achieved under the direction of the 'Palestine Exploration Fund,' a society organized in 1865 for the purpose of making an exhaustive exploration and an exact survey of the Holy Land. In 1870 the American Palestine Exploration Society was organized, and it was agreed that the English society should confine itself to the western side of the Jordan, and the American society to the eastern. The triangulation of Western Palestine was begun in 1871 and finished in 1877. A large and detailed map of the country has been published and an immense mass of valuable information regarding topography, natural history, etc., accumulated. The present population of the country is estimated at about 750,000, the Arab element being probably the prevailing one, and the Arabic language generally in use. The people consist partly of the fellahin or settled cultivators, artisans, etc.; partly of the nomad Bedouin, who live by rearing cattle or by less reputable means. The country exports some grain, olive-oil, oranges, etc.

Palestine, a city, capital of Anderson Co., Texas, 81 miles S. W. of Longview, has a cotton-seed oil mill and compress, saw and grist mills, etc. Iron and salt occur in the vicinity. Pop. 10,482.

Palestrina (pä-les-trē'na; ancient *Prænestе*), a town of Central Italy, 23 miles E.S.E. of Rome. It is of Greek origin, and has numerous ancient remains, and the Barberini Palace, now deserted. Pop. 6027.

Palestrina (pä-les-trē'na), GIOVANNI PIERLUIGI (or PIETRO ALOISIO) DA, an Italian musical composer, born at Palestrina in 1524; died in 1594. In 1551 he was appointed by Pope Julius III master of a choir of boys in the Julian Chapel, and was the first to receive the title of chapel-master. In 1554 he published a first collection of masses, and Julius admitted him into the college of choristers of the pope's chapel. He was dismissed by Pope Paul IV in 1555, but in the same year he was appointed chapel-master of San Giovanni in Laterano. He held this post for six years, when he exchanged

it for a similar appointment in the church Santa Maria Maggiore, in which he continued till 1571. In the meantime the Council of Trent, on reassembling in 1562, pointed out the necessity of a reform in church music, which had become vulgar and profane. A commission was appointed, and Palestrina composed three beautiful masses which created quite a revolution in sacred composition. One of them, the *Missa Papæ Marcelli*, is still celebrated. In 1571 Palestrina was appointed chapel-master of the Basilica San Pietro in Rome. He left an extraordinary number of musical compositions.

Palette (pal'et), PAINTER'S, an oval tablet of wood, or other material, very thin and smooth, on which painters lay the various colors they intend to use, so as to have them ready for the pencil. In connection with the palette painters use a palette knife, a thin, round-pointed knife for mixing up colors. The palette contains a hole at one end in which the thumb is inserted to hold it.

Paley (pā'li), FREDERICK APTHORP, grandson of the following, was born in 1816. Educated at Shrewsbury, he went afterwards to St. John's College, Cambridge, and took his degree in 1838. In 1846 he became a Roman Catholic, and in 1874 accepted the post of professor of classical literature in the Catholic College at Kensington. He died in 1888. His best title to fame rests on the valuable work he did as editor and annotator of classical texts, especially Æschylus and Euripides.

Paley, WILLIAM, an English theological and philosophical writer, was born at Peterborough in 1743; died in 1805. In 1758 he became a sizar of Christ's College, Cambridge, where he graduated B.A. as first wrangler in 1763. In 1766 he took his degree of M.A., and became a fellow and tutor of his college. In the following year he was ordained. In 1776 he married and gave up his fellowship. In 1780 he became prebendary of Carlisle, and in 1785 chancellor of the diocese. In 1794 he was made prebendary of St. Paul's and subdean of Lincoln; and in 1795 he received the rectory of Bishop-Wearmouth. He also received in this year the degree of D.D. from Cambridge University. His chief works are: *The Principles of Moral and Political Philosophy* (1785); *Horæ Paulinæ* (1790); *A View of the Evidences of Christianity* (1794); *Natural Theology, or Evidences of the Existence and Attributes of the Deity collected from the Appearance of Nature* (1802), founded on a work by Nieuwentyt, a Dutch philosopher. As a writer he had little claim to originality, but was distinguished by clearness and cogency of reasoning, lucidity of arrangement, and force of illustration. His system of moral philosophy is founded purely on utilitarianism.

Palghat (päl-ghät'), a town in Malabar, Madras, India. It is a busy entrepôt for the exchange of produce between Malabar and the upland country. Pop. 44,177.

Palgrave (pal'grāv), SIR FRANCIS, was born in London in 1788. He was a Jew, and his original name was Cohen, which he changed to Palgrave on embracing Christianity in 1823. He was called to the bar in 1827, and made himself known by his edition of the *Parliamentary Writs from 1273 to 1327* (1827–34), *History of England* (1831), *Rise and Progress of the Commonwealth* (1832). In 1832 he was knighted. He served on the Municipal Corporation Commission, 1833–35, and was appointed deputy-keeper of records in 1838. He died at Hampstead in 1861. His other works include *Truths and Fictions of the Middle Ages* (1844), *Reports of the Deputy-keeper of the Public Records* (1840–61), and the *History of Normandy and England* (1851–60).

Palgrave, FRANCIS TURNER, son of the above, was born in London in 1824, and educated at Charterhouse and Baliol College, Oxford. He became a fellow of Exeter College, and was for five years vice-principal of the Schoolmaster's Training College at Kneller Hall. He then acted as private secretary to Lord Granville, and later on held a post in the Education Department. In 1886 he was elected professor of poetry at Oxford. His literary works include *Idyls and Songs* (1854), *Golden Treasury of the Best Songs and Lyrical Poems* (1861), *Sonnets and Songs of Shakspere* (1865), *Essays on Art* (1866), and *Selected Lyrical Poems of Herrick* (1877). He died in 1897.

Palgrave, WILLIAM GIFFORD, brother of the foregoing, born in London in 1826; died in 1888. He graduated at Oxford, and from 1847 to 1853 served in the Bombay Light Infantry. He then became a Roman Catholic, was ordained a priest, joined the Jesuits, and engaged in missionary labors in India and Syria. In 1862 he undertook for Napoleon III, a journey through Central and Eastern Arabia. He subsequently left the Jesuits, entered the diplomatic service, and married. He acted as British consul at various places until 1876. He was appointed consul-

general in Bulgaria in 1878, in Siam in 1879, and in 1884 minister resident and consul-general in Uruguay, and his death took place at Montevideo. His literary works include *Personal Narrative of a Year's Journey through Central and Eastern Arabia* (1872); *Hermann Agha*, a story (1872); *Alkamah's Cave* (1875); and *Dutch Guiana* (1876).

Pâli (pâ'lē), the sacred language of the Buddhists, as closely related to Sanskrit as Italian to Latin. It is the language in which the oldest religious, philosophical, and historical literature of Buddhism is written, and is especially the language of the sacred books of the Buddhists of Ceylon, Burmah, and Siam; but it is no longer spoken anywhere, though a corrupt form of it is to some extent used for literary purposes. The study of Pâli was introduced into Europe by Lassen and Burnouf.

Palicourea (pā-li-kö'rē-a), a genus of plants, nat. order Rubiaceæ, tropical American shrubs with small or rather large flowers in compound thyrses or corymbs. *P. officinalis* is reported to be a powerful diuretic, and *P. tinctoria* forms a fine red dye, much valued in Peru. *P. densiflōra* yields coto bark (which see).

Palimpsest (pal'imp-sest; from Greek *palin*, again, *psēstos*, rubbed), a manuscript prepared by erasure for being written on again, especially a parchment so prepared by washing or scraping. This custom was brought about by the costliness of writing materials, and was practiced both by the Greeks and Romans, and in the monasteries, especially from the 7th to the 13th centuries. That which replaced the ancient manuscripts was nearly always some writing of an ecclesiastical character. The parchments which have been scraped are nearly indecipherable. Those which have been washed have often been revived by chemical processes. Fragments of the *Iliad* and extensive portions of many Greek and Roman writers have been recovered by these means.

Palinode (pal'i-nōd), in a general sense, a poetical recantation or declaration contrary to a former one. In Scots law it is a solemn recantation demanded in addition to damages in actions on account of slander or defamation raised in the commissary court, and even in the sheriff court.

Palisade (pal'i-sād), a fence or fortification consisting of a row of strong stakes or posts set firmly in the ground, either perpendicularly or obliquely, for the greater security of a position, and particularly for the closing up of some passage or the protection of any exposed point.

Palisander-wood (pal-i-san'dėr), a name in France for rosewood and some other woods.

Palissy (pal'i-si), Bernard, a French artist and philosopher, born about 1510. He was apprenticed in a glassworks at Agen, where he learned the art of painting on glass. Having completed his apprenticeship, he set out on a tour of France and Germany (1528), maintaining himself by practicing his craft of glass-painter and by land-surveying. During his travels he studied attentively all the books within his reach, and acquired an extensive knowledge of natural science. In 1505 he returned to France, married, and settled at Saintes. Shortly after his return his attention was attracted by a fine specimen of enameled pottery, and he thereupon resolved to discover for himself the secret of the enamel. Being ignorant of the potter's art he had to grope his way, and labored on year after year without success, almost starving, and reducing his family to the depths of poverty. At length, after sixteen years of unremunerated labor (1538–54), he obtained a pure white enamel, affording a perfect ground for the application of decorative art. He was now able to produce works in which he represented natural objects grouped and portrayed with consummate skill, and his enameled pottery and sculptures in clay became recognized as works of art. In 1562 he went to establish himself at Paris, where he continued to work at his art, and also delivered scientific lectures, which were attended by the most distinguished men in Paris, and contained views far ahead of his time. He suffered persecution as a Huguenot, and was arrested in 1589 and thrown into the Bastille, where he is said to have died in 1590. He left several philosophical works. See next article.

Palissy-ware, a peculiar kind of French art pottery invented by Bernard Palissy. The surface is covered with a jasper-like white enamel, upon which animals, insects, and plants are represented in their natural forms and colors. Specimens of this ware are much valued and sought after by collectors.

Paliurus (pa-li-ū'rus), a genus of deciduous shrubs, natives of the south of Europe and Asia Minor, and belonging to the nat. order Rhamnaceæ. See *Christ's Thorn*.

Palk Strait (pąk), a channel between the mainland of India and the north part of Ceylon, abounding in shoals, currents, sunken rocks, and sand banks.

Pall (pąl), a covering of black velvet thrown over a coffin while being borne to burial, the ends of which in a walking procession are held by the friends of the deceased. In another sense the pall or *pallium* is an ecclesiastical vestment sent by the sovereign pontiff on their accession to patriarchs, primates, and metropolitans, and sometimes, as a mark of honor, to bishops. It is made of white lamb's wool, and consists of a narrow strip of cloth encircling the neck and shoulders, with two narrow pieces hanging down, all embroidered with crosses.

Palladian Architecture (pa-lā′-di-an), a species of Italian architecture due to Palladio (see next article), founded upon the Roman antique as interpreted by the writings of Vitruvius, but rather upon the secular buildings of the Romans than upon their temples. It is consequently more applicable to palaces and civic buildings than to churches. A characteristic feature of the style is the use of engaged columns in façades, a single range of these often running through the two principal stories. It was introduced into England by Inigo Jones, a follower of the Venetian school of Palladio.

Palladio (pa-lā′di-ō), ANDREA, one of the greatest classical architects of modern Italy, was born at Vicenza in 1518; died at Venice in 1580, where he was architect of the republic. He perfected his architectural acquirements at Rome, and on his return to Vicenza he established his fame by his designs for many noble buildings both there and in other parts of Italy. From 1560 he erected many buildings at Venice. (See preceding article.) He was the author of a *Treatise on Architecture.*

Palladium (pa-lā′di-um), a wooden image of Minerva (Pallas) which is said to have fallen from heaven and to have been preserved in Troy. The Trojans believed that their city would be invincible so long as it contained the Palladium. The Romans pretended that it was brought to Italy by Æneas, and preserved in the temples of Vesta at Rome, but several Greek cities claimed to possess it.

Palladium, a metal discovered by Wollaston in 1803, and found in small quantity associated with native gold and platinum. It presents a great general resemblance to platinum, but is harder, lighter, and more easily oxidized; symbol Pd, specific gravity about 11.5. It is useful on account of its hardness, lightness, and resistance to tarnish, in the construction of philosophical instruments.

Palladius (pa-lā′di-us), RUTILUS TANNIS ÆMELIANUS, a writer of the fourth century after Christ. He was the author of a poem on agriculture, *De Re Rustica*, in 14 books.

Pallah (pal′la), a species of antelope (*Æpyceros melampus*) found in South Africa.

Pallanza (på-länt′så), a town of Italy beautifully situated on a promontory on the west side of Lago Maggiore. Pop. 4619.

Pallas (pal′as), of the minor planets revolving round the sun between Mars and Jupiter, that whose orbit is most inclined to the ecliptic. It was discovered in 1802 by Olbers at Bremen. It revolves round the sun in 4.61 years; diameter, 172 miles.

Pallas, PETER SIMON, traveler and naturalist, born at Berlin in 1741; died there in 1811. Becoming distinguished as a naturalist, he was sent by Catherine II, of Russia, in charge of a scientific expedition to Asiatic Russia. The results of his observations were published in his *Travels through Various Provinces of the Russian Empire* (1771–76). His other chief works are *Spicilegia Zoologica* (1767–80), *Flora Rossica* (1784–85), *Journey through Southern Russia* (1799, Eng. trans. 1812).

Pallas Athēnē (pal′as a-thē′nē), the Greek goddess of wisdom, subsequently identified with the Roman Minerva. See *Athena.*

Pallavicino (pal-a-ve-chē′nō), SFORZA, son of Marquis Alessandro Pallavicino, of Parma, was born at Rome in 1607, studied in the Roman College, and afterwards joined the Jesuits. He is famous as the historian of the Council of Trent, and stood high in the esteem of Pope Alexander VII, who made him a cardinal. He died in 1667.

Palliobranchiata (pal′-i-o-bran′ki-a-ta), the name formerly applied to the class of Brachiopodous Mollusca from the belief that the pallium or mantle lining the shell formed the chief organ of respiration.

Palliser (pal′is-ėr), SIR WILLIAM, born in Dublin in 1830. After passing through the Staff College at Sandhurst he obtained a commission in the Rifle Brigade (1855). He was subsequently transferred to the Hussars, and retired from the army in 1871. He

was the inventor of projectiles and guns which bear his name, and is the author of many improvements in fortifications, etc. He was knighted in 1873, and died in 1882.

Pallium. See *Pall.*

Pall-mall (pel-mel), an ancient game, in which a round boxwood ball was with a mallet or club struck through a ring elevated upon a pole, standing at either end of an alley, the person who could do so with fewest blows or with a number agreed on being the winner. The game was formerly practiced in St. James's Park, London, and gave its name to the street called Pall Mall.

Palm, the tree. See *Palms.*

Palma (päl'ma), an episcopal city of Spain, capital of the island of Majorca, 130 miles south of Barcelona. It is built in the form of an amphitheater, and enjoys an extremely mild and salubrious climate. The principal public buildings are the cathedral, the exchange, the governor's palace, and the town-house. There are schools of medicine and surgery, normal and nautical schools, two public libraries, and a museum. Shipbuilding yards employ numerous hands. Palma is the port of the whole island, and has an important trade. Pop. 63,937.

Palma, Jacopo, an Italian painter, called Palma Vecchio (the elder Palma), was born near Bergamo about 1480, and died in 1528. He is supposed to have been a pupil of Titian, and his later manner seems to have been modified by study of Giorgione. His work is less remarkable for draughtsmanship than for the suffused golden brilliance of its coloring. His most notable pieces are six paintings in the Church of S. Maria Formosa at Venice, and the *Three Graces* in the Dresden gallery.

Palma, La, the most northwesterly of the Canary Islands; area, 224 square miles; capital, Santa Cruz de la Palma, the principal port. It consists for the most part of elevated mountains, and in the north the coast is high and precipitous. The climate is agreeable and healthy, and the soil fertile. Besides a small quantity of grain, La Palma produces wine, fruits, sugar, honey, wax, silk, etc. Pop. 41,994.

Palma Christi, a name frequently applied to the castor-oil plant.

Palma di Montechiaro (mon-tā-kyä'rō), a town of Sicily, in the province and 14 miles E. S. E. Girgenti. It is noted for its almonds. Pop. 14,101.

Palmas (päl'mas), Cape, a headland of W. Africa, on the Guinea coast, lat. 4° 22′ 6″ N., lon. 7° 44′ 15″ W. There is a lighthouse with a fixed light, and the adjacent harbor, which is the only one between Sierra Leone and Benin, is spacious, secure, and protected by a reef from the swell of the ocean.

Palm-cat. See *Paradoxure.*

Palmelleæ (pal-mel'e-ē), Palmellaceæ, a nat. order of green-spored algæ, among the lowest of plants, including red snow (*Protococcus nivalis*), gory dew (*Palmella cruenta*), etc.

Palmer (pä'mėr), in mediæval times, was the name given properly to a pilgrim who had visited the Holy Land, from the circumstance that those who performed the pilgrimage to the sacred sepulcher generally carried on their return a palm branch as a memorial of their journey. The name was also given to other pilgrims.

Palmer, Edward Henry, an English Oriental scholar, born at Cambridge in 1840; graduated at St. John's College in 1867. He was a member of the survey expedition to Sinai (1868–69) and to Moab (1869–70), and on his return became professor of Arabic at Cambridge (1871). In 1882 he was killed by the Arabs in the Sinaitic peninsula. Among his numerous works are a *Persian-English Dictionary* (1876).

Palmer, a township of Hampden Co., Massachusetts, on the Chicopee River, 15 miles E. by N. of Springfield. It has manufactures of cotton, woolen, and wire goods and carpets. Pop. 8610.

Palmer (pä'mėr), Erastus Dow, sculptor, born in Onondaga county, New York, in 1817; died in 1904. Among his best works are *Indian Girl Contemplating a Crucifix*, *The White Captive*, *The Sleeping Peri*, and *Landing of the Pilgrims.*

Palmerston (pä'mėr-stun), Henry John Temple, Viscount, an English statesman, was born in Westminister in 1784; died in 1865. He was educated at Harrow, Edinburgh University, and St. John's College, Cambridge. In 1802 he succeeded his father in the title (an Irish one). In 1807 he was returned as member for Newport, Isle of Wight, and became junior lord of the admiralty in the Duke of Portland's administration. In 1809 he became secretary of war, and two years later he was elected

a member of Parliament for Cambridge University. He was a supporter of Catholic emancipation, and retired from office in the Wellington ministry in 1828 with others of the Canning party. He had already made a reputation for his command of foreign policy, and in 1830 he was made foreign secretary in the Whig ministry of Earl Grey. From this time he continued to be a member and leader of the Liberal party. In 1831 he was returned for Bletchingley, and after the Reform Bill (1832) for South Hants. He retired from office in December, 1834, but in April, 1835, he resumed his former

Viscount Palmerston.

appointment under Lord Melbourne. He continued in office as foreign secretary until 1841. It was during this period that he gained his great reputation for vigilance and energy in the conduct of foreign affairs. In 1845 he supported the repeal of the corn-laws, and in 1846 he was foreign secretary in the Russell ministry. Several causes of dissatisfaction, the chief being his recognition of Louis Napoleon without consulting his colleagues, led to Palmerston's resignation in December, 1851. In February, 1852, he became home secretary in the coalition ministry of Lord Aberdeen. On the resignation of this ministry he became prime-minister, which position he held, with a brief interruption, for the remainder of his life. He was made D.C.L. of Oxford in 1862, and elected Lord-rector of Glasgow University in 1863.

Palmerston, the chief settlement in the Northern Territory of S. Australia, on Port Darwin, accessible to ocean-going steamers of the largest draught. Pop. 600.

Palmer Worm, the common name for all the hairy caterpillars, but particularly that of the tiger-moth (*Arctia caja*).

Palmetto Palm (pal-met'tō), a common name of several palms, especially of the *Sabal Palmetto*, the cabbage-palm, which grows in the West Indies and in the Southern States of North America. It attains the height of 40 or 50 feet, and is crowned with a tuft of large leaves. It produces useful timber, and the leaves are made into hats, mats, etc.

Palmipedes (păl-mĭp'ē-dēz). See *Natatores.*

Palmistry. See *Cheiromancy.*

Palmitic Acid (pal-mit'ik), a fatty acid occurring in many fats, whether of the animal or vegetable kingdom, such as palm-oil, butter, tallow, lard, etc., existing partly in a free state but generally in combination with glycerine (as a glyceride). It forms a solid, colorless, inodorous body, which melts at 62° C.

Palm-kale (pâm'kāl), a variety of the cabbage extensively cultivated in the Channel Islands. It grows to the height of 10 or 12 feet, and has much the aspect of a palm.

Palm-oil, a fatty substance obtained from several species of palms, but chiefly from the fruit of the oil-palm, or *Elæis guineensis*, a native of the west coast of Africa. This tree grows to the height of 30 feet, bears a tuft of large pinnate leaves, and has a thick stem covered with the stumps of the stalks of dead leaves. The fruits, which are borne in dense clusters, are about 1½ inches long by 1 inch in diameter, and the oil is obtained from under their fleshy covering. In cold countries it acquires the consistence of butter, and is of an orange-yellow color. It is employed in the manufacture of soap and candles, for lubricating machinery, wheels of railway-carriages, and many other purposes. By the natives of the Gold Coast this oil is used as butter; and when eaten fresh

Palm-oil Tree (*Elæis guineensis*).

is a wholesome and delicate article of diet. It is called also *Palm-butter.*

Palms (pämz), the Palmaceæ, a nat. order of arborescent endogens, chiefly inhabiting the tropics, distinguished by their fleshy, colorless, six-parted flowers, enclosed within spathes; their minute embryo, lying in the midst of albumen, and remote from the hilum; and their rigid, plaited or pinnated leaves, sometimes called fronds. The palms are among the most interesting plants in the vegetable kingdom, from their beauty, variety, and associations, as well as from their great value to mankind. While some, as *Kunthia montāna, Oreodoxa frigida,* have trunks as slender as the reed, or longer than the longest cable (*Calamus rudentum* being 500 feet), others, as *Jubœa spectabilis* and *Cocos butyracea,* have stems 3 and even 5 feet thick; while some are of low growth, as *Attalēa amygdalina,* others exhibit a stem towering from 160 to 190 feet high, as *Ceroxylon andicŏla* or wax-palm of South America. Also, while they generally have a cylindrical, undivided stem, *Hyphæne thebaica* (the doum palm of Upper Egypt) and *Hyphæne coriacea* are remarkable for their repeatedly divided trunk. About 600 species are known, but it is probable that many are still undescribed. Wine, oil, wax, flour, sugar, sago, etc., are the produce of palms; to which may be added thread, utensils, weapons, and materials for building houses, boats, etc. There is scarcely a single species in which some useful property is not found. The cocoanut, the date, and others are valued for their fruit; the cabbage-palm, for its edible terminal buds; the fan-palm, with many more, is valued for its foliage, whose hardness and durability render it an excellent material for thatching; the sweet juice of the Palmyra and others, when fermented, yields wine; the center of the sago-palm abounds in nutritive starch; the trunk of the wax-palm exudes a valuable wax; oil is expressed in abundance from the oil-palm; many of the species contain so hard a kind of fibrous matter that it is used instead of needles, or so tough that it is manufactured into cordage; and, finally, their trunks are in some cases valued for their strength, and used as timber, or for their elasticity or flexibility. There is only one European species, the *Chamærops humilis.* See *Chamærops;* also, *Arcca, Betel-nut, Cabbage-palm, Cocoanut, Coquilla-nut, Date, Doum Palm, Fan-palm, Palm-oil, Palmyra Palm,* etc.

Palm-sugar, a saccharine substance obtained from the juice of various palms.

Palm Sunday, the last Sunday before Easter, on which Christ's entry into Jerusalem, when palm branches were strewed before him, is celebrated. It is still celebrated with much solemnity by the Roman Catholics, and branches are strewed in the churches.

Palm Wine or Toddy, a species of wine obtained by fermenting the juice of the flowers and stems of the cocoanut palm, the Palmyra palm, the oil-palm, and other palms.

Palmyra (pal-mī′rȧ; Hebrew, *Tadmor,* City of Palms), an ancient city of Syria, now in ruins, situated in an oasis 140 miles E. N. E. of Damascus. It was founded or enlarged by Solomon in the tenth century B.C. It was an entrepôt for the trade between Damascus and the Mediterranean, and during the wars between the Romans and the Parthians it acquired great importance. It became the faithful ally of Rome, and during the reign of Gallienus (260–268) Odenathus, the ruler of Palmyra, established an independent Palmyrene kingdom. Odenathus was succeeded by his widow Zenobia, to whom Palmyra chiefly owes its fame, and who took the title of Queen of the East. She was besieged in Palmyra by Aurelian, and compelled to surrender. On his departure the inhabitants revolted, on which Aurelian returned and destroyed the city (A.D. 273). He permitted the inhabitants to rebuild it, but it never recovered its importance. In 1400 Tamerlane completely destroyed it. There are remains of ancient buildings, chiefly of the Corinthian order, with the exception of the Temple of the Sun, which is Ionic. See *Zenobia.*

Palmyra Palm (*Borassus flabelliformis*), the common Indian palm, a tree ranging from the northeastern parts of Arabia through India to the Bay of Bengal. In India and other parts of Asia it forms the chief support of 6,000,000 or 7,000,000 of population. Its fruit is a valuable food, its timber is excellent, and it furnishes thatch, cordage, and material for hats, fans, umbrellas, etc. It produces sugar and arrack, and its leaves are used for writing tablets. The young shoots are boiled and eaten, the seeds are edible, and the fruit yields a useful oil. A full-grown Palmyra is from 60 to 70 feet high, and its leaves are very large. The name Palmyra wood is frequently given to other woods of a similar nature.

Palolo (pa-lō′lō), a dorsibranchiate annelid (*P. viridis*) found in great abundance in the sea near the coral

Palmyra Palm (*Boriassus flabelliformis*).

reefs in the South Sea Islands. They are taken in large numbers in nets by the islanders, who esteem them, when roasted, as a great delicacy.

Palos (pä′lōs), a small town of Andalusia, in Spain, famous as the port whence Columbus sailed for the discovery of the New World in 1492. Pop. 1200.

Palpi (pal′pi), jointed processes, supposed to be organs of touch, attached in pairs to the labium and maxilla of insects, and termed respectively *labial* and *maxillary palpi* or feelers. (See figure at *Entomology*.) Palpi are developed also from the oral appendages of spiders and crustacea.

Palpitation (pal-pi-tā′shun) consists of repeated attacks of violent and spasmodic action of the heart. When palpitation arises from organic lesion of the heart it is called *symptomatic*, when it is caused by other disorders disturbing the heart's action it is called *functional*. Disorders which may cause palpitation include nervous affections, anæmia, chlorosis, protracted mental emotion, excessive use of stimulants, etc.

Palsy (pȧl′si), paralysis, especially a local or less serious form of it. See *Paralysis*.

Paludal Diseases (pal′ū-dal; L. *palus*, *palūdis*, a marsh), diseases arising, like malaria, in marshy places.

Paludan-Müller (pål′ö-dån mül′-lėr), FREDERIK, the chief recent poet of Denmark, born in 1809, and educated at Copenhagen University. He began his career as a poet in 1832, and died in 1871. His works include *Adam Homo*, a humorous didactic poem; *Kalanus*, an Indian tragedy; *Adonis*, a poetic romance; *Amor and Psyche*, a lyrical drama, etc.

Palunpur. See *Pahlanpur*.

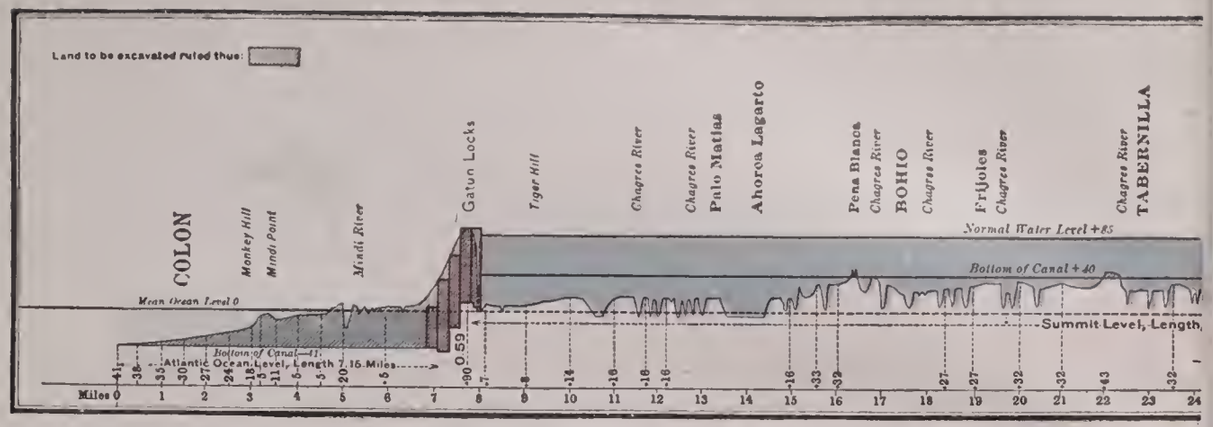
Pamiers (pȧ-mi-ā), a cathedral city of S. France, dep. Ariège. It has ironworks and textile and other mills. Pop. 7728.

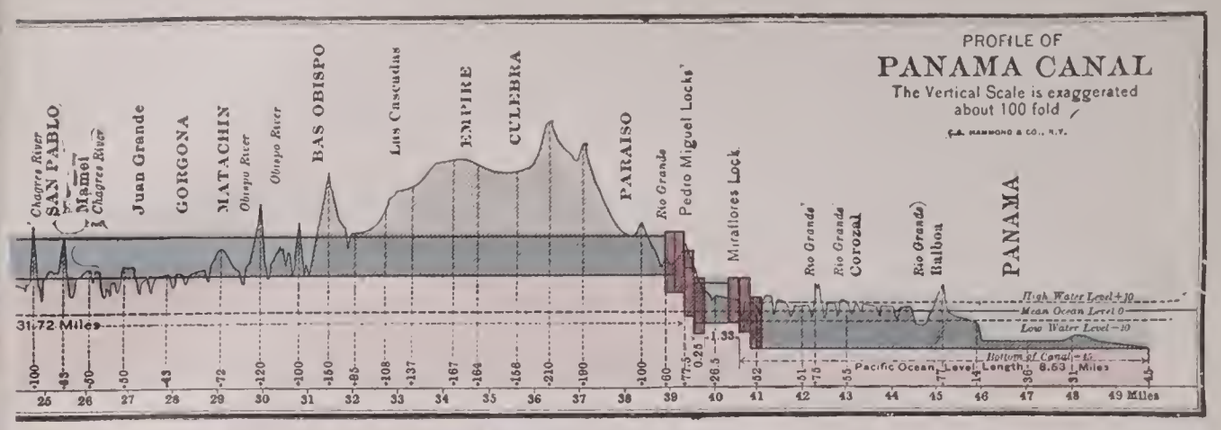
Pamir (pä′mēr), an elevated region of Central Asia, that may be regarded as formed by the meeting of the Himalayan and Thian Shan mountain systems. It forms a plateau having a general elevation of more than 13,000 feet, dominated by still loftier ridges and summits clothed with eternal snow. There are several small lakes here, and the sources of the Oxus take their rise in the Pamir. The atmosphere is exceedingly dry, the extremes of heat and cold are very great, and a large part of the surface is bare and barren. The Kirghiz, however, find a certain amount of pasture for their cattle in summer, and in favored localities there is a little cultivation. The Pamir, or 'roof of the world,' is celebrated throughout Central Asia, and trade routes have passed across it for ages.

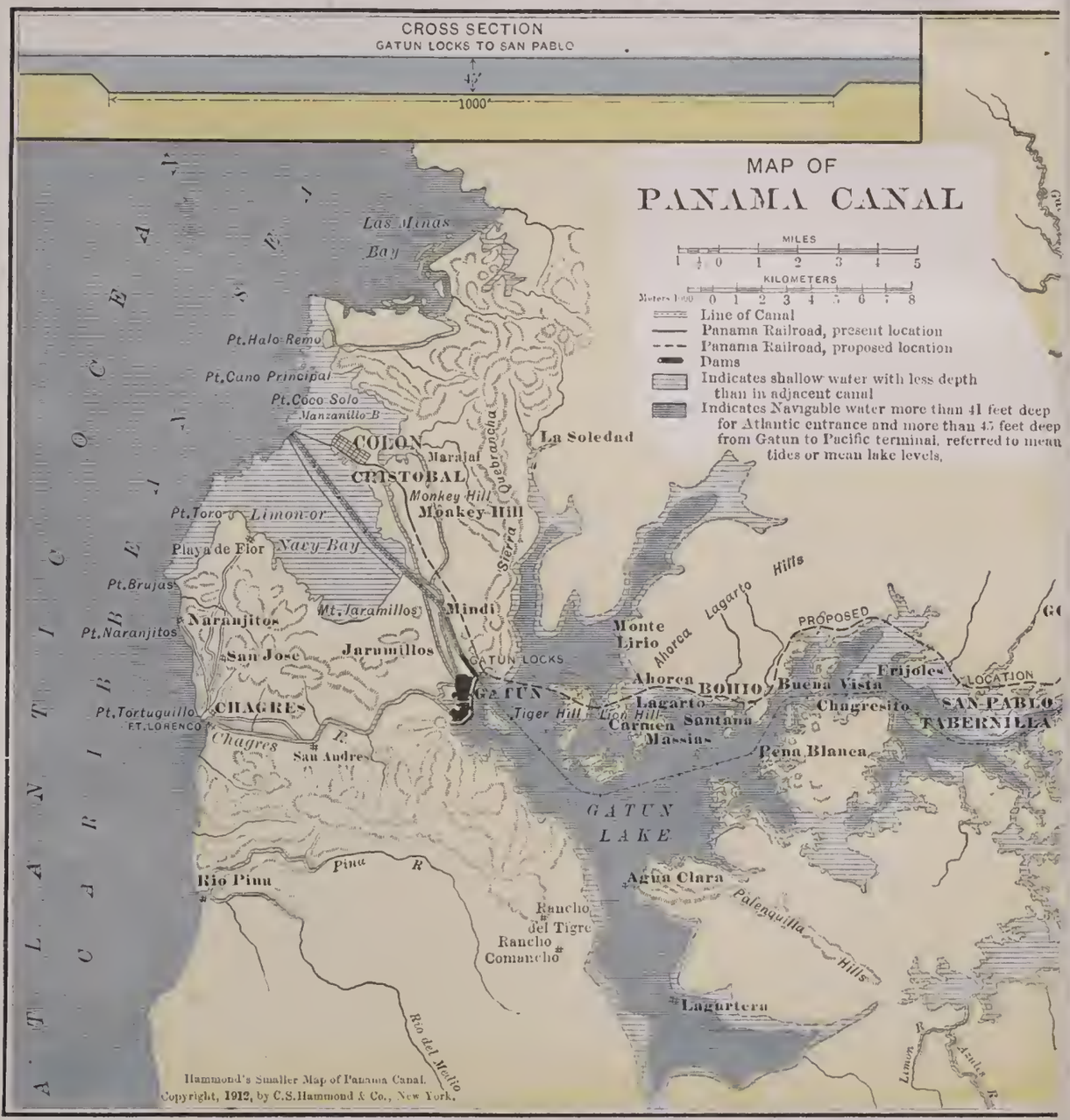
Pamlico Sound (pam′li-kō), a shallow lagoon on the southeast coast of North Carolina. It is 80 miles long, from 8 to 30 miles wide, and separated from the ocean by long, narrow, sandy islands. Vessels can enter it through Ocracoke and Hatteras inlets.

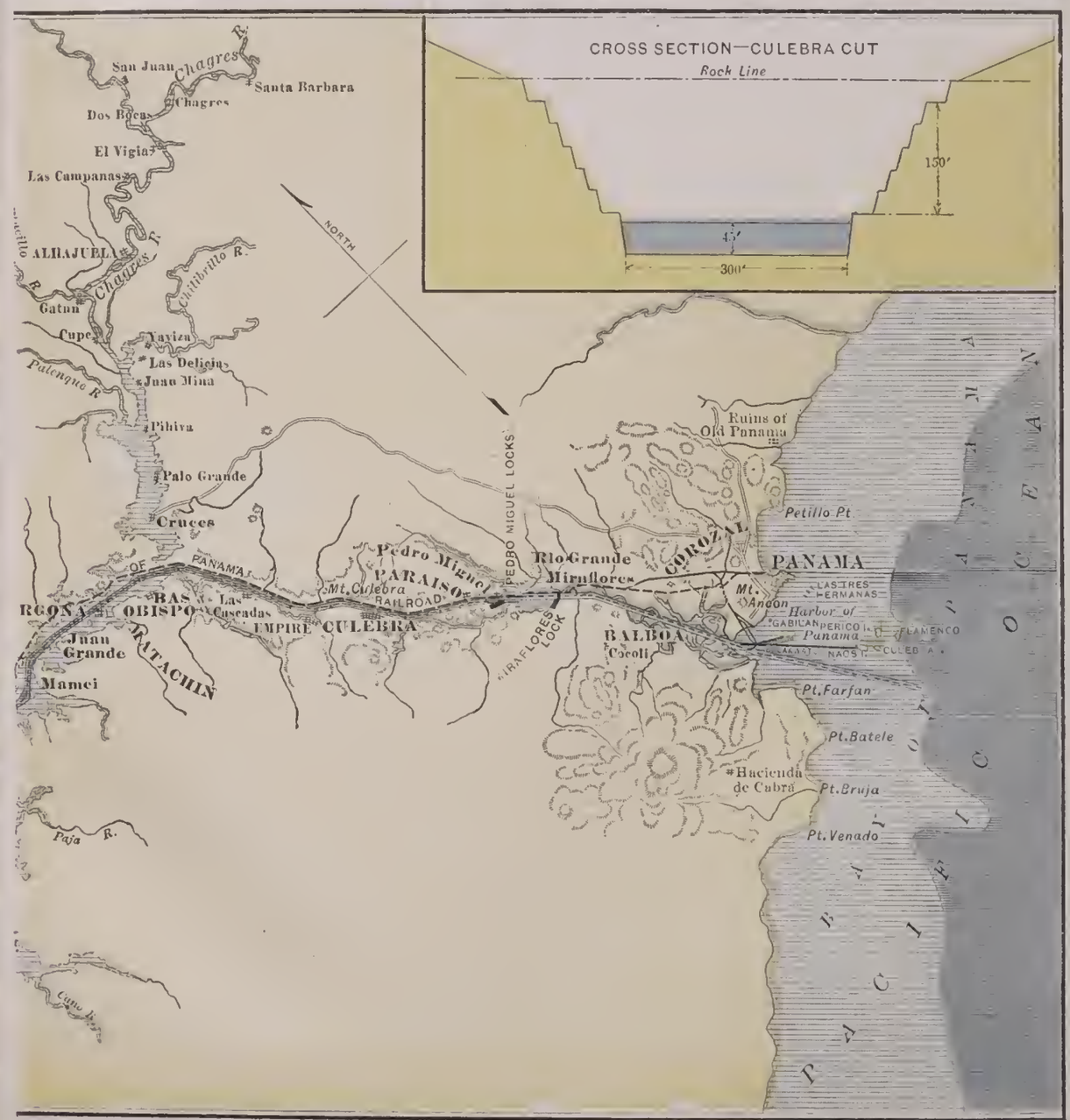
Pampas (pam′pas), a name given to the vast treeless plains of South America in the Argentine Republic, Paraguay, and Uruguay. The pampas are generally covered with grass and other herbage, and in many parts with gigantic thistles, but with the heat of summer the vegetation is much burned up. Shallow lakes or swamps occur in some parts, and parts have the character of a salt steppe. The pampas are roamed over by various tribes of Indians, as well as by herds of wild horses and cattle. In many parts there are now cattle ranches, and large flocks of sheep are also reared.

Pampas-grass (*Gynerium argentĕum*), a grass which grows in the pampas in the southern parts of South America. It has been introduced in the United States and Europe


Land to be excavated noted thus:
COLON
Monkey Hill
Mindi Point
Mindi River
Gatun Locks
Tiger Hill
Chagres River
Palo Matias
Ahorca Lagarto
Pena Blanca
BOHIO
Frijoles
TABERNILLA
Normal Water Level +85
Bottom of Canal +40
Mean Ocean Level 0
Summit Level, Length
Bottom of Canal—41
Atlantic Ocean Level, Length 15 Miles
0.59
Miles 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24


PROFILE OF
PANAMA CANAL
The Vertical Scale is exaggerated about 100 fold
SAN PABLO
Juan Grande
GORGONA
MATACHIN
BAS OBISPO
Las Cascadas
EMPIRE
CULEBRA
PARAISO
Pedro Miguel Locks
Miraflores Lock
Corozal
Balboa
PANAMA
31.72 Miles
High Water Level +10
Mean Ocean Level 0
Low Water Level —10
Bottom of Canal —45
Pacific Ocean Level, Length 8.53 Miles
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 Miles


CROSS SECTION
GATUN LOCKS TO SAN PABLO
45'
1000'
MAP OF
PANAMA CANAL
MILES
KILOMETERS
Line of Canal
Panama Railroad, present location
Panama Railroad, proposed location
Dams
Indicates shallow water with less depth than in adjacent canal
Indicates Navigable water more than 41 feet deep for Atlantic entrance and more than 45 feet deep from Gatun to Pacific terminal, referred to mean tides or mean lake levels.
Las Minas Bay
Pt. Halo Remo
Pt. Cano Principal
Pt. Coco Solo
Manzanillo B
COLON
Marajal
CRISTOBAL
Monkey Hill
Monkey Hill
La Soledad
Sierra
Quebrancha
Pt. Toro
Limon or Navy Bay
Playa de Flor
Pt. Brujas
Pt. Naranjitos
Naranjitos
Mt. Taramillos
Mindi
San Jose
Jaramillos
GATUN LOCKS
GATUN
Tiger Hill
Lion Hill
Monte Lirio
Ahorca
Lagarto Hills
PROPOSED
LOCATION
Ahorca
BOHIO
Lagarto
Carmen
Santana
Massias
Buena Vista
Chagresito
Frijoles
SAN PABLO
TABERNILLA
Pena Blanca
CHAGRES
Pt. Tortuguillo
FT. LORENCO
Chagres R.
San Andres
GATUN LAKE
Rio Pina
Pina R.
Agua Clara
Palenquilla Hills
Rancho del Tigre
Rancho Comancho
Lagartera
Rio del Mallo
Hammond's Smaller Map of Panama Canal.
Copyright, 1912, by C.S. Hammond & Co., New York.


San Juan
Chagres R.
Santa Barbara
Chagres
Dos Bocas
El Vigia
Las Campanas
ALHAJUELA
Chagres R.
Chilibrillo R.
Gatun
Cupe
Yayiza
Las Deligia
Juana Mina
Palenque R.
Pihiva
Palo Grande
Cruces
NORTH
CROSS SECTION—CULEBRA CUT
Rock Line
150'
45'
300'
PEDRO MIGUEL LOCKS
MIRAFLORES LOCK
Pedro Miguel
PARAISO
Mt. Culebra
RAILROAD
RIO GRANDE
Mirafiores
COROZAL
PANAMA
Mt. Ancon
LAS TRES HERMANAS
Harbor of Panama
PERICO I.
FLAMENCO I.
NAOS I.
CULEBRA
BALBOA
Cocoli
RGONA
OBISPO
Las Cascadas
EMPIRE
CULEBRA
Juan Grande
Mamei
MATACHIN
Ruins of Old Panama
Petillo Pt.
Pt. Farfan
Pt. Batele
Hacienda de Cubra
Pt. Bruja
Pt. Venado
Paja R.
Cano R.
PACIFIC OCEAN

ENTRANCE TO THE PANAMA CANAL FROM THE ATLANTIC OCEAN

A completed section of the main channel, 500 feet wide.

as an ornamental plant. It has panicles of silvery flowers on stalks more than 10 feet high, and its leaves are from 6

Pampas-grass (*Gynerium argentĕum*).

to 8 feet long. The male and female flowers are on separate stalks.

Pampero (pam-pā′rō), a violent wind from the west or southwest which sweeps over the pampas of South America.

Pamphylia (pam-fil′i-a), an ancient province of Asia Minor, extending along the Mediterranean from Cilicia on the east to Lycia on the west. It was mountainous, being covered with the ramifications of the Taurus Mountains. Pamphylia never attained any political importance. It was subject successively to Persia, Macedonia, Syria, and Rome, although some Greek colonies for a time succeeded in maintaining their independence.

Pamplona (pam-plō′na), or PAMPELU′NA, a city of Spain, and capital of the province of Navarre or Pamplona, and of the ancient kingdom of Navarre, on the Arga, 78 miles northwest of Saragossa, 197 northeast of Madrid. The town is strongly fortified, and has a cathedral dating from the end of the fourteenth century. The public fountains are supplied by a magnificent aqueduct. Pop. 28,886.

Pan, a rural divinity of ancient Greece, the god of flocks and herds, represented as old, with two horns, pointed ears, a goat's beard, goat's tail, and goat's feet. The worship of Pan was well established, particularly in Arcadia. His festivals were called by the Greeks *Lycæa*, and were known at Rome as the *Lupercalia*. Pan invented the syrinx or *Pandean* pipes.

Pan.

Pana, a city of Christian county, Illinois, 42 miles S. E. of Springfield. It has coal-mining interests, a hay compress, creamery, etc. Pop. 6055.

Panama (pan-a-mä′), a town and capital of the Republic of Panama, on the Gulf of Panama and on the Pacific coast of the Isthmus of Panama. The city lies on a tongue of land, across which its streets stretch from sea to sea. The harbor is shallow, but affords secure anchorage. Panama is chiefly important as the terminus of the interoceanic railway and also of the Panama Canal (which see). The railway, which has been in operation since 1855, runs across the isthmus from Panama to Colon or Aspinwall on the Atlantic, and accommodates a large traffic. Pop. 30,000.

Panama, a republic of South America, occupying the isthmus connecting North and South America, and formerly a department of Colombia, from which it seceded in 1903. It has the Caribbean Sea on the N. and the Pacific Ocean on the S., and is about 350 miles long and 120 miles wide — reduced to a little over 40 miles in its narrowest part. Area about 31,600 square miles. It is traversed by a range of mountains, with a peak 11,970 feet high, and sinking to less than 400 feet at the point selected for the Panama Canal. Much of the lowlands is covered with a luxuriant tropical forest, and various economic plants of tropical America are grown. The rivers are of considerable length. It has a population of about 250,000, the largest part of Spanish descent, also numerous negroes and a few Chinese. Panama is the capital city.

Panama, ISTHMUS OF, formerly called the Isthmus of Darien, has a breadth of from 40 to 120 miles, con-

nects North with South America, and separates the Pacific from the Atlantic. The coast is rocky and lofty along the Caribbean Sea, but low and swampy along the Pacific. See *Panama.*

Panama Canal, a great ship canal now being excavated across the Isthmus of Panama to connect the Atlantic with the Pacific Ocean. This immense enterprise was originally undertaken in 1881 by a French company under M. de Lesseps, the maker of the Suez Canal. The work of excavation went on until 1887, when the enormous expenditure of money ($226,000,000) and the comparatively little work accomplished brought operations to an end, the company falling into difficulties, and suspending payment in 1889. In 1892 criminal proceedings were instituted by the French government against the leading officers of the canal company, and they and several prominent French officials were convicted of bribery. The abandoned work was taken up by another company, but no marked progress was made. Meanwhile a project had developed within the United States to excavate a similar canal across Nicaragua, surveys had been made and other preliminary steps taken. At this juncture the French company offered to sell its partly completed canal and its rights obtained under treaty with Colombia to the United States for $40,000,000. In consequence of this offer the Nicaragua Canal project was abandoned. The Senate of Colombia refusing to ratify this purchase, the department of Panama seceded (November, 1903), formed an independent republic, and made the requisite concessions of right of way and dominion, for which $10,000,000 was to be paid. These preliminary negotiations completed, the United States Canal Commission was reorganized, with eminent expert engineers as its members, and in 1905 the work was actually resumed. Excavation, however, was preceded by sanitation. The region to be excavated was subject to yellow fever, malaria, and other tropical diseases, through the effects of which the French working force had been terribly decimated. In the interval that had elapsed successful methods of handling and preventing those diseases had been developed, and within a year or two after the date above given the canal zone had been cleansed of the scourge of yellow fever, and made as healthful as probably any part of the United States, the comfort as well as the health of the workmen had been attended to, and in the years of active excavation that followed the death- and sick-rate proved to be marvelously reduced. When the work of excavation was once fairly begun, it progressed at a rapidity that surprised the world, the use of enormous dredging machines and working appliances not in existence at the date of the French operations enabling the American engineers to prosecute their work with unprecedented speed. The total amount of earth removed by the two French companies had been about 81,000,000 cubic yards. Much of this was useless in the new plan and about 195,000,000 cubic yards remained to be moved. Of this the Americans had taken out about 148,000,000 cubic yards by September 1, 1911, leaving 47,000,000 to be excavated. This, and all the other work, could readily be completed within a few more years and it was confidently promised that the canal would be in full operation by the 1st of January, 1915.

The length of the canal from the Atlantic to the Pacific shore line is 40½ miles, and is about 50 miles between deep water at its two extremities. It is to have a minimum depth of 41 feet and a minimum width of 300 feet, the average bottom width being 649 feet. The great difficulty in this enterprise is the crossing of the mountain range, which here sinks to a low depression, 363 feet above sea-level. The excavation of this ridge (the Culebra cut, as it is called) has been the greatest problem to be solved in making the canal. A second is the disposition of the Chagres River, the valley of which, and at intervals the channel, is followed by the canal. It is subject to sudden and great floods in the time of tropical rains, and from the start has been a serious difficulty to the engineers. The ridge and the river rendered the original idea of a sea-level canal at once extremely costly and highly perilous, and a lock canal, with a summit level 85 feet above sea-level, was chosen instead. This rendered necessary three locks on each of the Atlantic and Pacific sides, those on the Atlantic being located together at Gatun, about 7 miles from deep water on the canal route. Here an enormous concrete dam is being constructed, 7200 feet, or 1.4 miles in length along its crest, and 1600 feet broad at its greatest width. The crest of the dam is at an elevation of 115 feet, or 30 feet above the level of the great Gatun Lake, which the dam will make by holding back the waters of the Chagres. This lake will be 1000 feet wide for a distance of nearly 16 miles, when it will narrow to 800 feet, the narrowest portion of the canal, 300

CULEBRA CUT, PANAMA CANAL
View of the great cut looking north between Contractor's Hill and Gold Hill.

feet, being in the Culebra cut. The canal will be of depth and capacity enough to accommodate the greatest ships now afloat. Its cost has increased far beyond the orginal estimates and is now set at $375,000,000, or possibly a total of $400,000,000, including the fortifications which it is proposed to build at the two ends. When the Panama Canal is completed it will rank with the greatest enterprises ever undertaken by man; much the greatest, if we consider it at once from the viewpoints of cost, utility, and rapidity of accomplishment.

Pan-American Congress. A congress of representatives of the nations of the American continent, the first meeting of which was held at Washington, D. C., in 1890, to discuss matters relating to commercial intercourse and international relations between the countries concerned. A second meeting was held at Mexico in 1901, a third at Rio de Janerio in 1906, and a fourth at Buenos Ayres in 1910. These meetings have been productive of much good in developing friendly relations between the American republics.

Pan-American Exposition, an exhibition participated in by the countries of North and South America, held at Buffalo, New York, in 1901. The new possessions of the United States, Hawaii, Porto Rico, and the Philippines, participated. While on a much smaller scale than the Columbian Exposition of 1893, it was in its way as handsome and attractive, especially in its remarkable electrical display, and had a very large number of visitors. A tragic feature of the exposition was the assassination of President McKinley while visiting it.

Panay (på-nī′), an island of the Philippines, between Mindoro and Negros. It is of triangular form, about 100 miles broad and 100 miles long. It is mountainous but very fertile, and the inhabitants have made considerable progress in civilization. Capital Iloilo. Pop. 743,646.

Pancoast (pan′kōst), JOSEPH, an eminent physician, born in Burlington Co., New Jersey, in 1805; died in 1882. For many years he held professorships of surgery and anatomy in the Jefferson Medical College of Philadelphia. He published *Operative Surgery*, etc.— WILLIAM HENRY PANCOAST, his son, born at Philadelphia in 1835, died in 1897, succeeded his father as professor in the Jefferson Medical College, and was president of the Medico-Chirurgical College from 1886 to 1896. He gained a high reputation for skill in surgery.

Pancreas (pan′krē-as), the sweetbread of animals; one of the viscera of the abdomen. In men it lies behind the stomach in front of the first and second lumbar vertebræ. The pancreas is an oblong gland about 8 inches long, 1½ inches broad, and from ½ to 1 inch thick. Its right extremity, called the *head*, lies in a bend of the duodenum. The *tail* or left extremity extends to the spleen. The structure of the pancreas is similar to that of the salivary glands. It is composed of lobules throughout. The secretion of this gland is conveyed to the intestine by the *pancreatic duct*. This duct runs from right to left, and is of the size of a quill at its intestinal end. The *pancreatic juice* is a clear, ropy fluid. The functions of the pancreatic juice in digestion are devoted to the conversion of starchy elements into sugar and to the assimilation of fatty matters. It also acts upon albuminoid matters.

Pancsova (pân′cho-vå), a town of Hungary, 8 miles E. N. E. of Belgrade, at the confluence of the Temes with the Danube. It is well built, and carries on a good trade with Turkey. Pop. 19,044.

Panda (pan′da), or WAH (*Ailurus fulgens*), an animal of the bear family, found in the woody parts of the mountains of Northern India,

Panda (*Ailurus fulgens*).

about equal to a large cat in size. It is chestnut-brown in color, and dwells chiefly in trees, preying on birds, small quadrupeds, and large insects.

Pandanaceæ (pan-da-nā′se-ē), the Screw-pine family of plants, endogenous trees or shrubs, with flowers unisexual or polygamous; perianth wanting, or consisting only of a few scales. The fruit is either in parcels of fibrous drupes or in berries. The leaves are long, imbricated, and amplexicaul. Aerial roots are a feature of many. The order is divided into two sections, *Pan-*

daneæ and *Cyclantheæ;* the first with undivided leaves and no perianth, the second with fan-shaped or pinnate leaves, and flowers having a few scales. They are tropical plants, and furnish edible and other useful products. Panama hats are made from one species. The typical genus is *Pandănus.* See *Screw-pine.*

Pandects (pan'dektz), a collection of laws, systematically arranged, from the works of Roman writers on jurisprudence, to which the Emperor Justinian gave the force of law, A.D. 533. See *Corpus Juris.*

Panderpur (pan'dur-pör), PANDHARPUR, a town in Bombay, India, held in great reverence by the Brahmans for its Temple of Vishnu. Pop. 32,405.

Pandi'on. See *Osprey.*

Pandit (pan'dit), or PUNDIT, a learned Brahman; one versed in the Sanskrit language, and in the sciences, laws and religion of the Hindus.

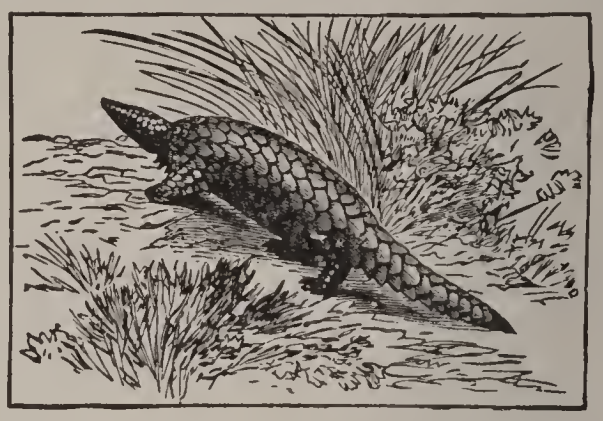
Pandoors (pan'dörz), the name given to a body of Hungarian soldiers, who, about the middle of last century, were dreaded for their savage mode of warfare.

Pandora (pan-dō'ra), in Greek mythology, the first woman on earth, sent by Zeus to mankind in vengeance for Prometheus's theft of heavenly fire. Each of the gods gave her some gift fatal to man. According to later accounts, the gods gave her a box full of blessings for mankind, but on her opening the box they all flew away, except hope. Epimetheus, brother of Prometheus, married her.

Panel (pan'el), a schedule or roll of jurors. (See *Jury.*) In Scottish law, the prisoner at the bar is the panel.

Pangenesis (pan-jen'i-sis), a theory of reproduction offered by Charles Darwin, in his *Animals and Plants under Domestication.* He suggests that all units of the body throw off minute granules, which gather from all parts of the body to form the sexual elements, their development in the next generation forming a new being. It will suffice to say that this theory has not been accepted.

Pangolin (pan'gō-lin), the name applies to the Scaly Anteaters (Manidæ), forming a family of the Edentate order of mammals. They occur in Southern Asia and Africa; have the body invested by a covering of imbricated scales of horny material; vary from 3 to 4 feet in length, and defend themselves by assuming the form of a ball. The tail is long, and the feet are provided with strong curved claws, which assist the animals in burrowing. The jaws



Four-toed Pangolín (*Manis tetradactyla*).

are destitute of teeth, and the tongue is of great length. The food consists of insects. The four-toed pangolin (*Manis tetradactyla*) inhabits W. Africa.

Panic (pan'ik), the name of some species of millet (*Panicum*).

Panicle (pan'i-kl), a form of inflorescence differing from a raceme in having a branched instead of a simple axis. See *Inflorescence.*

Pânini (pa-nē'nē), a celebrated Indian grammarian who is supposed to have lived not later than the 4th century B.C. His Sanskrit grammar is highly scientific, but extremely abstruse.

Panipat (pä-nē-pat'), a town of India, in the Punjab, 50 miles north by west of Delhi; surrounded by an old wall. Pop. about 30,000.

Panizzi (på-nit'zē), SIR ANTHONY, principal librarian of the British Museum, born at Brescello, Modena, in 1791. Having engaged in revolutionary movements, he came to England in 1822, and became professor of Italian in University College in 1828. In 1837 he was appointed keeper of printed books in the British Museum, and succeeded to the principal librarianship in 1856. He conceived and designed the plan for the new library and reading room, which is at once novel and very convenient. He died in 1879.

Panjim. See *Goa.*

Panjnad. See *Punjnud.*

Panna. See *Punnah.*

Panniar. See *Punniar.*

Pannonia (pan-nō'ni-a), the ancient name of a district of Europe comprising the eastern parts of Austria, Carinthia, Carniola, the part of

STEAM SHOVEL LOADING ROCK, PANAMA CANAL

These great shovels, handling several tons of material at each operation, have made the rapid progress in digging the canal possible.

Hungary between the Danube and the Save, Slavonia, and parts of Croatia and Bosnia. The Pannonians were finally subdued by Tiberius, A.D. 8, and Pannonia became a Roman province. It had numerous towns, of which Vindobona (Vienna) was the chief.

Panompenh. See *Pnom-penh.*

Panorama (pan-o-rå′ma; from Gr. *pan*, all, the whole, and *horāma*, view), a painting in which all the objects that can be seen naturally from one point are represented on the concave side of a whole or half cylindrical wall, the point of view being the axis of the cylinder. A painting of this kind when well mounted produces a complete illusion, and no other method is so well calculated to give an exact idea of an actual view. See *Diorama.*

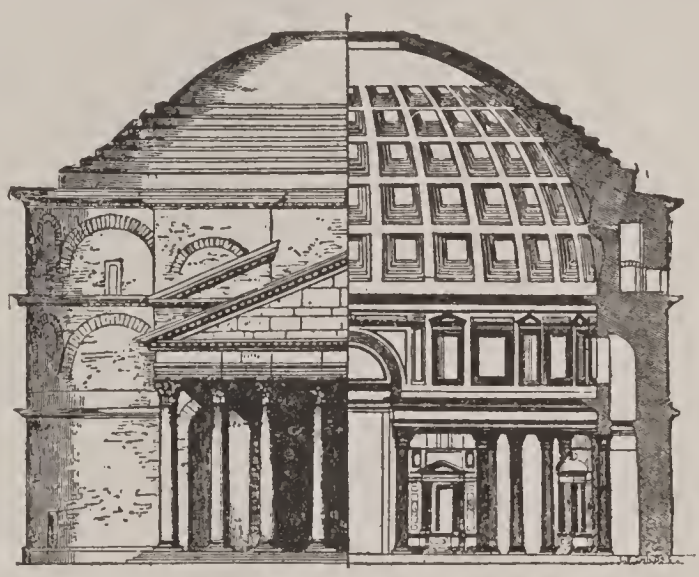
Panslavism (pan′slav-izm), a general name for the efforts or aspirations of the Slavonic races in Europe, or some of them, after union, including the Russians, Czechs, Servians, Bulgarians, etc.

Pan′tagraph. See *Pantograph.*

Pantellaria (pän-tel-lå-rē′a), a fertile volcanic island of the Mediterranean, 50 miles E. S. E. of Cape Bon in Africa, and 80 miles southwest of Sicily, of which it is a dependency; length, north to south, 9 miles; breadth, 6 miles. It produces figs, raisins, wine, olives, etc. Pop. 8619.

Pantheism (pan-thē′izm; Gr. *pan*, all, and *theos*, god), in philosophy, the doctrine of the substantial identity of God and the universe, a doctrine that stands midway between atheism and dogmatic theism. The origin of the idea of a God with the theist and the pantheist is the same. It is by reasoning upon ourselves and the surrounding objects of which we are cognizant that we come to infer the existence of some superior being upon whom they all depend, from whom they proceed, or in whom they subsist. Pantheism assumes the identity of cause and effect. Matter, not less than mind, is with it the necessary emanation of the Deity. The unity of the universe is a unity which embraces all existing variety, a unity in which all contradictions and all existing and inexplicable congruities are combined. Pantheism has been the foundation of nearly all the chief forms of religion which have existed in the world. It was represented in the East by the Sankhya of Kapila, a celebrated system of Indian philosophy. The Persian, Greek and Egyptian religious systems were also pantheistic. Spinoza is the most representative pantheist of modern times. A twofold division of pantheism has been proposed:— 1. That which loses the world in God, one only Being in whose modifications are the individual phenomena. 2. That which loses God in the world and totally denies the substantiality of God.

Pantheon (pan′thē-on, or pan-thē′-on; Greek, *pan*, all; *theos*, god), a celebrated temple at Rome, built in 27 B.C. by Marcus Agrippa. It is a large edifice of brick, built in circular form, with a portico of lofty columns. It has the finest dome in the world (142½ feet internal diameter, 143 feet internal height), and its portico is almost equally celebrated. It is now a church, and is known as Santa Maria Rotonda. Raphael and other famous men are buried within its walls. The Pantheon in Paris, for some time the church of St. Geneviève, is a noble edifice with a lofty dome, devoted to the interment of illustrious men.



Pantheon at Rome.
Half elevation. Half section.

Panther (pan′thėr; *Felis pardălis*), one of the Felidæ or Cat tribe, of a yellow color, diversified with roundish, black spots, a native of Asia and Africa. The panther is now supposed to be identical with, or a mere variety of, the leopard. (See *Leopard.*) The name panther (in vulgar language *painter*) is given to the puma in America.

Pantograph (pan′tō-graf), also called PANTAGRAPH and PENTAGRAPH (from Gr. *pan*, all, and *graphein*, to write or delineate), an instrument consisting of four limbs joined together by movable joints, and so constructed that by means of it maps and plans may be copied mechanically either

on the scale on which they are drawn or on an enlarged or reduced scale. It is made in a variety of forms.

Pantomime (pan′tu-mīm), properly a theatrical representation without words, consisting of gestures, generally accompanied by music and dancing. The modern Christmas pantomime is a spectacular play of a burlesque character, founded on some popular fable, and interspersed with singing and dancing, followed by a harlequinade, the chief characters in which are the harlequin, pantaloon, columbine and clown, which may be traced back to the Italian pantomime, although their present development is almost entirely modern.

Panuco (pȧ′nö-kō), a town of Mexico, state of Vera Cruz, on the Panuco, 27 miles above its mouth at Tampico. Pop. 5000.

Paoli (pȧ′o-lē), Pasquale de, a Corsican patriot, born in 1726; died in 1807. In 1755 he was appointed captain-general by his countrymen, who were struggling for their independence against Genoa. He organized the government and military resources of the island, and maintained a protracted and generally successful struggle with the Genoese. The latter being unable to subdue the island, sold it to France in 1768. After a brief struggle Paoli was obliged to yield, and took refuge in England. After the Revolution of 1789 he was recalled by the National Assembly, and made lieutenant-general of Corsica. Disagreements with the Democratic party in France soon led him to throw himself into the arms of England, and through his influence the crown was offered to George III. Subsequently he withdrew to England, and received a pension from the British government.

Papa (pä′po), a town of Hungary, 75 miles west of Budapest. It has a castle of the Esterhazy family, a Protestant college, etc. Pop. 17,426.

Papa (pȧ′pȧ), the Latin form of *Pope*, the name given by the Greek and Armenian churches to all their priests.

Papacy. See *Popes*.

Papal States (pā′pal), the name given to that portion of Central Italy of which the pope was sovereign by virtue of his position. The territory extended irregularly from the Adriatic to the Mediterranean, and eventually comprised an area of 15,289 square miles with 3,126,000 inhabitants. Rome was the capital. The foundation of the Papal States was laid in 754, when Pepin le Bref presented the exarchate of Ravenna to Stephen II, Bishop of Rome. Benevento was added in 1053, and in 1102 Matilda of Tuscany left Parma, Modena, and Tuscany to the pope. In 1201 the Papal States were formally constituted an independent monarchy. Subsequently various territories were added to or subtracted from the pope's possessions, which were incorporated with France by Napoleon in 1809, but restored to the pope in 1814. A revolution broke out in Rome in 1848, and the pope fled to Gaeta, but he was reinstated by French troops, and Rome was garrisoned by French soldiers until 1870. In the meantime one state after another threw off its allegiance to the pope and joined the kingdom of Italy, and when the French left Rome in August, 1870, King Victor Emmanuel took possession of the city, declared it the capital of Italy, and thus abolished the temporal power of the pope.

Papantla (pȧ-pȧnt′lȧ), a town of Mexico, in the state of Vera Cruz, about 120 miles northeast of Mexico. It indicates its ancient splendor by its massive ruins. Pop. about 10,000.

Papa′ver. See *Poppy*.

Papaveraceæ (pa-pa-vėr-ā′se-ē), the poppy family of plants, an order belonging to the polypetalous division of the exogens. It contains about 160 species, mostly members of the northern temperate regions. They are smooth herbs, rarely shrubs, with alternate, often cut leaves, and solitary, handsome flowers. The poppies are the most familiar members.

Papaw (pȧ-pạ′; *Carĭca Papāya*, nat. order Papayaceæ), a tree of South America, now widely cultivated in tropical countries. It grows to the height of 18 to 20 feet, with a soft herbaceous stem, naked nearly to the top, where the leaves issue on every side on long footstalks. Between the leaves grow the flower and the fruit, which is of the size of a melon. The juice of the tree is acrid and milky, but the fruit when boiled is eaten with meat, like other vegetables. The juice of

Papaw (*Carica Papaya*).

the unripe fruit is a powerful vermifuge; the powder of the seed even answers the same purpose. The juice of the tree or its fruit, or an infusion of it, has the singular property of rendering the toughest meat tender, and this is even said to be effected by hanging the meat among the branches.—The papaw of North America is *Asimīna trilōba*, nat. order Anonaceæ; it produces a sweet, edible fruit.

Paper (pā′pėr), a thin and flexible substance, manufactured principally of vegetable fiber, used for writing and printing on, and for various other purposes. Egypt, China, and Japan are the countries in which the earliest manufacture of paper is known to have been carried on. The Egyptian paper was made from the papyrus (whence the word *paper*), but this was different from paper properly so called. (See *Papyrus*.) According to the Chinese the fabrication of paper from cotton and other vegetable fibers was invented by them in the second century B.C. From the East it passed to the West, and it was introduced into Europe by the Arabs. Spain is said to have been the first country in Europe in which paper from cotton was made, probably in the eleventh century; and at a later period the manufacture was carried on in Italy, France, and Germany. It cannot now be ascertained at what time linen rags were first brought into use for making paper; but remnants of Spanish paper of the twelfth century appear to indicate that attempts were made as early as that time to add linen rags to the cotton ones. The earliest paper manufactory known to have been set up in England was that of John Tate, at Stevenage, in Hertfordshire, about 1495. The manufacture in England, however, long remained in a backward state, so that until late in the eighteenth century the finer qualities of paper were imported from France and Holland.

After the introduction into Europe of cotton and linen rags as materials for papermaking, other vegetable fibers were for many centuries almost entirely given up, rags being cheaper than any other material. It was only about the close of the eighteenth century that paper-manufacturers again began to turn their attention to the possibility of using vegetable fibers as substitutes for rags, one of the earliest signs of the new departure being a work containing sixty specimens of paper made from different vegetable materials, published in 1772 by a German named Schöffer or Schäffers. Straw, wood and esparto are the chief vegetable fibers which have been found most suitable for the purpose.

The process by which paper is produced depends on the minute subdivision of the fibers, and their subsequent cohesion; and before the making of the paper properly begins the rags or other materials have to be cleaned from impurities, boiled in a strong lye, and reduced by special machinery to the condition of a thin pulp, being bleached with chloride of lime. It is at this stage of the manufacture that size is added, and toned and other colored papers have the coloring matter introduced. The pulp, composed of the fibrous particles mixed with water, is now ready to be made into paper.

Paper is made either by the hand or by machinery. When it is made by the hand the pulp is placed in a stone vat, in which revolves an agitator, which keeps the fibrous particles equally diffused throughout the mass; and the workman is provided with a *mold*, which is a square frame with a fine wire bottom, resembling a sieve, of the size of the intended sheet. These molds are sometimes made with the wires lying all one way, except a few which are placed at intervals crosswise to bind the others together, and sometimes with the wires crossing each other as in a woven fabric. Paper made with molds of the former kind is said to be *laid*, and that made with those of the latter kind *wove*. The so-called *water-mark* on paper is made by a design woven in wire in the mold. Above the mold the workman places a light frame called a *deckle*, which limits the size of the sheet. He then dips the mold and deckle into the pulp, a portion of which he lifts up horizontally between the two, gently shaking the mold from side to side, to distribute the fibers equally and make them cohere more firmly, the water, of course, draining out through the wire meshes. The sheets thus formed are subjected to pressure, first between felts, and afterwards alone. They are then *sized*, pressed once more, and hung up separately on lines in a room to dry. The freedom with which they are allowed to contract under this method of drying gives to handmade paper its superior firmness and compactness. After drying they are ready for making up into quires and reams, unless they are to be glazed, which is done by submitting the sheets to a very high pressure between plates of zinc or copper.

In papermaking by machinery, a process patented in France in the end of the eighteenth century, the pulp is placed in iron vessels at one end of the ma-

chine, and is kept constantly agitated by a revolving spindle with arms attached to it. From these the pulp passes to the *pulp-regulator*, by which the supply of pulp to the machine is kept constant, thence through sand-catchers and strainers till it reaches the part of the machine which corresponds to the hand-mold. This consists of an endless web of brass wire-cloth, which constantly moves forward above a series of revolving rollers, while a vibratory motion from side to side is also given to it, which has the same object as shaking the mold in making by the hand. Meanwhile its edges are kept even by what are called *deckle* or *boundary straps* of vulcanized India rubber. At the end of the wire-cloth the pulp comes to the *dandy-roll*, which impresses it with any mark that is desired. The fabric is now received by the felts, also, like the wire part of the machine, an endless web, the remaining water being pressed out in this part of the machine by four or five consecutive rollers. If intended for a printing-paper, or any other kind that requires no special sizing, it is dried by being passed round a succession of large hot cylinders, with intermediate smoothing rolls. It is then rendered glossy on the surface by passing between polished cast-iron rollers called *calenders*, and is finally wound on a reel at the end of the machine, or submitted to the action of the cutting machinery, by which it is cut up into sheets of the desired size. If the paper is to be sized, the web, after leaving the machine, is passed through the sizing-tub, and is then led round a series of large skeleton drums (sometimes as many as forty) with revolving fans in the inside, by the action of which it is dried. If the paper were dried by hot cylinders after the sizing, there would be a loss of strength in consequence of the drying being too rapid. After being dried the paper is glazed by the *glazing-rollers*, and then cut up. In some cases the sizing is done after the paper has been cut into sheets, these being then hung up to dry on lines, like hand-made paper, acquiring in the process something of the same hardness and strength. The total length of a paper-machine, from the beginning of the wire-cloth to the cutters, is frequently more than 100 feet.

Paper was made from straw at the beginning of the last century, and the material is now largely used. The chief and best use of straw is to impart stiffness to common qualities. To prevent brittleness, however, it is necessary to destroy the silica contained in the straw by means of a strong alkali. Paper is now also made entirely from wood, previously reduced to a pulp; much the greater part of it being thus made. Esparto or Spanish grass, exported largely from Spain, Algeria, Tripoli, Tunis, and other countries, has been applied to papermaking only in comparatively recent years, but has risen rapidly into favor. The use of rushes for papermaking belongs to America, and dates from the year 1866. The root of the lucern has also been applied with success in France of late years to the fabrication of paper. Various mineral substances are sometimes added to the fibrous materials necessary to make paper, such as a silicate of alumina called Lenzinite, kaolin or porcelain earth, and artificial sulphate of barium (permanent white). The first two substances have a tendency to diminish the tenacity of the fabric; the last is thought by some manufacturers to be beneficial to printing-papers, enabling them to take a clearer impression from the ink.

Blotting and filtering paper are both made in the same way as ordinary paper except that the sizing is omitted. Copying paper is made by smearing writing paper with a composition of lard and black-lead, which, after being let alone for a day or so, is scraped smooth and wiped with a soft cloth. Incombustible paper has been made from asbestos, but since fire removes the ink from a book printed on this material, the invention is of no utility, even though the paper itself be indestructible. Indelible check paper has been patented on several occasions. In one kind of it the paper is treated with an insoluble ferrocyanide and an insoluble salt of manganese, and is sized with acetate of alumina instead of alum. Parchment paper or vegetable parchment is made from ordinary unsized paper by treatment with sulphuric acid or oil of vitriol and ammonia. The so-called rice paper is not an artificial paper, but a vegetable membrane imported from China, and obtained apparently from the pith of a plant called *Aralia papyrifera*. Tissue paper is a very thin paper of a silky softness used to protect engravings in books and for various other purposes. Tracing paper is made from tissue paper by soaking it with Canada balsam and oil of turpentine or nut-oil and turpentine.

In recent times the uses of paper have greatly multiplied. Besides being largely employed for making collars, cuffs, and other articles of dress, it is sometimes used for making huts in the backwoods of America; for making boats, pipes, and tanks for water; cuirasses to resist mus-

Courtesy of the West Virginia Pulp & Paper Co.

MAKING PAPER

This view shows the machine room in a paper mill, with two machines in operation.

ket-bullets, wheels for railway-carriages, and even bells and cannons. Paper wheels have been used for some of Pullman's railway saloon cars in America, and have worn out one set of tires. Cannons made of paper have actually been tried with success. These are only a few of the articles made of paper. We may add to them barrels, vases, milk-bottles, straw hats, into which no straw enters; clothing, handkerchiefs, etc. Even whole houses have been built of paper — in Norway is a church, holding 1000 persons, built entirely of it. The demand for paper has become so great, in view of the vast quantities now used for printing purposes, that more than 3,000,000 cords of wood are now used annually in this country for making paper pulp, and large quantities in Canada, spruce yielding the principal supply. Other species are being experimented with and even the stalks of the cotton plant.

In England a tax or duty on paper was imposed in the reign of Queen Anne, and was not repealed till 1861. At one time the duty was levied according to size or value, but later by weight. So long as it was payable according to size, paper, as it proceeded from the mill, was cut with rigorous exactness into certain standard sizes, distinguished by different names. These were frequently departed from when the duty was made payable according to weight, but a number of sizes distinguished by different names are still made, such as *pot*, *foolscap*, *post*, *royal*, *imperial*, etc. These are now the names of standard sizes of paper, royal being 19x24 inches.

Paper-hangings, ornamental papers often pasted on the walls of the rooms in dwelling-houses. The staining of papers for this purpose is said to be a Chinese invention, and was introduced into France early in the seventeenth century. It is now common everywhere, but more especially in France, England, and the United States. Most of the processes in paper-staining are now usually done by machinery; but there is still much hand-work in the finer qualities, especially those produced in France. The first operation is that of grounding, which consists in covering the surface with some dull color, the tint of which varies. Papers with a glazed ground are usually glazed immediately after receiving the ground tint. The designs on the surface of paper-hangings are applied by hand processes and machines exactly similar to those employed in calico-printing. (See *Calico-printing.*) *Flock-paper* is made by printing on the parts which are to receive the flock a mixture of strong oil boiled with litharge and white lead, to render it drying. The colored flock is then sprinkled on the paper, and adheres to the parts to which the mixture has been applied.

Paper Money. See *Currency.*

Paper Mulberry. See *Mulberry.*

Paper Nautilus. See *Argonaut.*

Paphlagonia (paf-la-gō′ni-a), the former name of a mountainous district in the north of Asia Minor, between Bithynia on the west and Pontus on the east, separated from the latter by the Halys. On the coast was the Greek city Sinope. Paphlagonia was first subdued by Crœsus, king of Lydia, and afterwards formed part of the Persian Empire, until its satraps made themselves independent. It was ruled by native princes from 316 B.C. until subdued by Mithridates (63 B.C.), on whose overthrow the district was incorporated with the Roman Empire.

Paphos (pā′fos), the name of two ancient cities in Cyprus — Old Paphos, a little more than a mile distant from the southwestern coast, upon a height; and New Paphos (modern *Baffa*), 7 or 8 miles to the northwest of Old Paphos, situated on the seashore. The first was famous in antiquity for the worship of Aphroditē (Venus). At New Paphos St. Paul preached before the proconsul Sergius.

Papias (pā′pi-as), a Christian writer of the age succeeding that of the apostles. He is described by Irenæus as a 'hearer of John and a companion of Polycarp,' and was martyred at Pergamus in 163 A.D. He was the author of five books on the *Sayings of our Lord*, all lost, except a few valuable fragments, which give important information as to the early traditions regarding the New Testament: *e. g.* that Matthew's Gospel was believed to have been written in Hebrew, and that the Evangelist Mark was the interpreter (*hermeneutēs*) of Peter, and wrote to his dictation.

Papier Mâché (pap-yā mä-shā; Fr. 'mashed paper'), a substance made of cuttings of white or brown paper boiled in water, and beaten in a mortar till they are reduced into a kind of paste, and then boiled with a solution of gum Arabic or of size to give tenacity to the paste. Sulphate of iron, quicklime, and glue or white of egg, are sometimes added to enable the material to resist the action of water, and borax and phosphate of soda to render

it to a great extent fire-proof. It is used for making all sorts of useful and ornamental articles that can be formed in molds. Another variety of papier mâché is made by pasting or gluing sheets of paper together, and pressing them when soft into the form which it is desired to give them.

Papilio (pa-pil′i-ō), a genus of butterflies (Lepidoptera), containing some well-known species, as the swallow-tailed butterfly (*Papilio machāon*), the peacock butterfly (*P. Io*), etc.

Papilionaceæ (pa-pil-yo-nā′she-ē), a division of plants, forming a suborder of the Leguminosæ (which see), distinguished by the resemblance of the superior petals of their flowers to the extended wings of a butterfly (Latin, *papilio*). The best-known examples are the pea and bean, which are the typical plants of this division.

Papillæ (pa-pil′ē), the name applied in physiology to small or minute processes protruding from the surface of the skin, or of membranes generally, and which may possess either a secretory or other function. The human skin exhibits numerous papillæ, with divided or single extremities, and through which the sense of touch is chiefly exercised. The papillæ of the tongue are important in connection with the sense of taste. See *Skin* and *Tongue*.

Papin (pȧ-paṇ), Denys, natural philosopher, born in Blois, in France, in 1647. Having visited England, he was in 1681 admitted a fellow of the Royal Society. The revocation of the Edict of Nantes preventing him from returning to his native country, he settled at Marburg, in Germany, in 1687, as professor of mathematics, retaining this charge till 1707. He is believed to have died in Germany about 1714. He is best known for the invention denominated Papin's Digester (see *Digester*).

Papinianus (pap-in-i-ā′nus), Æmilius (Papinian), a Roman lawyer, born under Antoninus Pius, about 140 A.D. His learning and integrity won him the first offices of state, and he was ultimately chosen prefect of the prætorian guards under the Emperor Septimius Severus, whom he accompanied to Britain. The Emperor Caracalla caused him to be executed in 212. In the Pandects are 595 excerpts taken from his works.

Papion (pā′pi-on), *Cynocephălus sphinx*, a species of dog-headed baboon, akin to the mandril. It was held in great reverence in Egypt, selected individuals being kept near the temples, in the caves of which their mummied forms have been often found.

Pappenheim (pap′en-hīm), Gottfried Heinrich, Count of, imperial general in the Thirty Years' war, born in 1594 at Pappenheim, in Bavaria. He distinguished himself in the battle of Prague as colonel, in 1620; in 1623-25 served in Lombardy as commander of a regiment of cuirassiers (the Pappenheim dragoons). In 1626 he conquered, with the assistance of the Bavarians, 40,000 peasants in Upper Austria, and in 1630 joined Tilly, who ascribed the loss of the battle of Leipzig in 1631 to his impetuosity. He appeared on the field of Lützen on the side of Wallenstein, but was mortally wounded, and died the day after the battle, 1632.

Pappus (pap′us), in botany, the feathery appendage that crowns many single-seeded seed-vessels; for example, the down of the dandelion.

Pappus, Alexandrinus, mathematician, flourished at Alexandria in the fourth century after Christ. All his works appear to have perished, except portions of his *Mathematical Collections*, which possess great value, and have sufficed to found his fame. They include geometrical problems and theorems, a treatise on mechanics, etc.

Papu′a. See *New Guinea*.

Papyrus (pa-pī′rus; *Papȳrus antiquōrum*, or *Cypĕrus papyrus*), an aquatic plant belonging to the nat. order Cyperaceæ or sedges. It has acquired celebrity from furnishing the paper of the ancient Egyptians. The root is very large, hard, and creeping; the stem is several inches thick, naked, except at the base, 8 to 15 or more feet high, triangular above, and terminated by a compound, widespreading, and beautiful umbel, which is surrounded with an involucre composed of eight large sword-shaped leaves. The little scaly spikelets of inconspicuous flowers are placed at the extremity of the rays of this umbel. Formerly it was extensively cultivated in Lower Egypt, but is now rare there. It is abundant in the equatorial regions of Africa in many places, and is found also in Western Africa and in

Egyptian Papyrus (*Papȳrus antiquorum*).

Southern Italy. The inhabitants of some countries where it grows manufacture it into various articles, including sail-cloth, cordage, and even wearing apparel and boats. Among the ancient Egyptians its uses were equally numerous, but it is best known as furnishing a kind of paper. This consisted of thin strips carefully separated from the stem longitudinally, laid side by side, and then covered transversely by shorter strips, the whole being caused to adhere together by the use of water and probably some gummy matter. A sheet of this kind formed really a sort of mat. In extensive writings a number of these sheets were united into one long roll, the writing materials being a reed pen and ink made of animal charcoal and oil. Thousands of these papyri or papyrus rolls still exist (many of them were found in the ruins of Herculaneum), but their contents, so far as deciphered, have only been of moderate value.

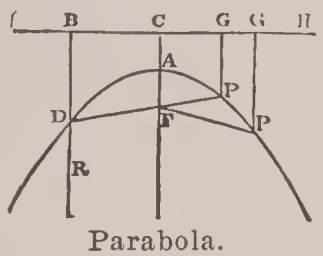
Par (pår; Latin, 'equal') is used to denote a state of equality or equal value. Bills of exchange, stocks, etc., are *at par* when they sell for their nominal value; *above par* or *below par* when they sell for more or less.

Para (på-rå'), a small Turkish and Egyptian coin, of copper or copper and silver, the fortieth part of a Turkish piaster (grush). Value, about ⅛ of a cent.

Pará (på-rå'), or BELEM, a city and seaport in Brazil, capital of the province of Pará, on the right bank of the estuary of the Pará (or of the River Tocantins). The principal buildings are the governor's palace, the cathedral, and the churches of Santa Anna and São João Baptista. It is the seat of the legislative assembly of the province. The port, defended by forts, is capable of admitting vessels of large size. The principal exports are caoutchouc, cacao, Brazil nuts, copaiba, rice, piassava, sarsaparilla, annotto, cotton, etc. Pop. 50,064. The province of Pará, the most northerly in Brazil, comprises an area of 443,790 square miles on both sides of the lower Amazon, and consists chiefly of vast alluvial plains connected with this river and its tributaries. These latter comprise the Tapajos and the Xingu, besides many others, the Tocantins being another great stream from the south. The province possesses immense forests, and is extremely fertile, but there is little cultivation, the inhabitants being fewer than one to the square mile. The trade centers in the capital. It is now facilitated by steamboats navigating the Amazon and Tocantins. Pop. estimated at 652,000.

Parable (par'a-bl), a short tale in which the actions or events of common life are made to serve as a vehicle for moral lessons. The parable is a mode of teaching peculiarly adapted to the Eastern mind, and was common among the Jews before the appearance of Christ. It is exemplified in the Old Testament in the parable addressed by Nathan to David (II Sam., xii), and there are frequent examples of it in the Talmud and the Gospels.

Parabola (par-ab'u-la), one of the curves known as conic sections. If a right cone is cut by a plane parallel to a slant side, the section is a parabola. It may also be defined as the curve traced out by a point which moves in such a way that its distance from a fixed point, called the 'focus,' is always equal to its perpendicular distance from a fixed straight line, called the 'directrix.' In the figure B H is the directrix and F the focus, while P is a point that moves so that the perpendicular G P is always equal to the line P F; the curve P A D described by a point so moving is a parabola. The line F A C through the focus is the axis or principal diameter; any line parallel to it, as B D R, is a diameter. The path of a projectile in vacuo, when not a vertical straight line, is parabolic.



Parabola.

Parabolani (par-a-bo-lā'ni), in the early Christian church, a class of men whose chief duty was to attend on the sick and diseased.

Paracelsus (par-a-sel'sus), or PHILIPPUS AUREOLUS THEOPHRASTUS BOMBASTUS VON HOHENHEIM, empiric and alchemist, born at Einsiedeln, in the canton of Schwyz, in Switzerland, in 1493. Dissatisfied with the means of acquiring knowledge in his native country, he traveled over the greater part of Europe, everywhere seeking to add to his knowledge. In the course of his travels he became acquainted with remedies not in common use among physicians (probably preparations of mercury), by means of which he performed extraordinary cures, and obtained great reputation. In 1526 he accepted the chair of medicine offered him by the magistrates of Basel, and lectured there till the spring of 1528. The failure of a lawsuit, and the consequent quarrel with the judges, led him to resume his wandering life, at first accompanied by his pupil Oporinus, who, however, disgusted with his violence and intemper-

ance, at length left him. He died at the hospital of St. Sebastian at Salzburg in 1541. For a long time he was regarded as little better than a charlatan, but he enriched science, particularly chemistry and medicine, with some valuable discoveries, and, indeed, is sometimes looked upon as the founder of modern therapeutics.

Parachute (pa′ra-shöt), an apparatus of an umbrella shape and construction, usually about 20 or 30 feet in diameter, attached to balloons, by means of which the aeronaut may descend slowly from a great height. It is shut when carried up, and expands by inflation when the aeronaut begins to descend; but it is not altogether to be depended on, and accidents in connection with its use have been frequent. The earliest

Parachute (Garnerin's Parachute descending).

mention of a machine of this kind is in a MS. describing experiments made with one in 1617. In 1783 the French physician Lenormand made several further experiments at Montpellier; and shortly after the machine became well known through the descents of Blanchard in Paris and London. See *Aeronautics*.

Paraclete (par′a-klēt; Gr. *paraklētos*, a counselor, comforter), the Comforter, the Holy Ghost (John, xiv, 16).

Paracoto, the bark of a South American tree, probably a species of Cryptocarya. The bark has a spicy odor and an aromatic and pungent taste. It is used as an appetizer and in diarrhœal diseases. Its active principle is called paracotoin, a pale yellow, crystalline body, tasteless and odorless and sparingly soluble in water.

Paradise (par′a-dīs), the garden of Eden. The word is originally Persian, and signifies a park. It was introduced into the Greek language in the form *paradeisos* by Xenophon, and has been introduced into modern languages as a name for the garden of Eden (and hence of any abode of happiness) through its use in that sense in the Septuagint.

Paradise, Bird of. See *Bird of Paradise*.

Paradox (par′a-doks), a statement or proposition which seems to be absurd, or at variance with common sense, or to contradict some previously-ascertained truth, though, when duly investigated, it may prove to be well founded.

Paradoxure (par-a-doks′ūr; *Paradoxūrus typus*), an animal of the civet family (Viverridæ), common in India, and known also as the palm-cat from its habit of climbing palm-trees to eat their fruit. It can curl its tail into a tight spiral.

Paragould, a city, capital of Greene County, Arkansas, 21 miles N. E. of Jonesboro. It is an important lumber shipping point, and has large stave factories and other industries. Pop. 5248.

Paraffin (par′a-fin), a solid white substance of a waxy appearance which is separated from petroleum and ozokerite, and is also largely obtained by the destructive distillation of various organic bodies, such as brown coal or lignite, bituminous coal, shale, etc. The process generally consists in heating bituminous shale in iron retorts at a low red heat; condensing the tarry products, and purifying these by distillation, washing successively with soda, water, and acid, and again distilling. Those portions of the oil which solidify in the final distillations are collected separately from the liquid portions, washed with soda and acid, and crystallized or again distilled. The partially purified paraffin (called *paraffin scale*) is now again treated with acid, allowed to solidify, submitted to the action of centrifugal machines, and finally strongly pressed in order to remove any liquid oil which may still adhere to it. The refined paraffin is largely manufactured into candles, which may be either white or colored, and may be mixed with a certain quantity of wax, etc. The liquid oils obtained in the process come into commerce under the general name of paraffin-oil, the lighter oils being used for illuminating and the heavier for lubricating purposes. Paraffin has received its name (Lat. *parum*, little; *affinis*, akin) on account of its remarkable indifference to or want of affinity with other substances. Besides being used for candles, it is used for vestas and tapers, for waterproofing,

sizing, and glazing fabrics, as an electric insulator, as a coating for the inside of beer barrels, etc.

Paraguay (pä′rä-gwā, or gwī), a republic of South America, surrounded by the Argentine Republic, Brazil, and Bolivia; separated from the first by the River Paraná, its tributary the Paraguay, and the Pilcomayo, a tributary of the latter; from Brazil by the Paraná, a range of hills, and the Apa, a tributary of the Paraguay; area, 98,000 square miles. The whole surface belongs to the basins of the Paraguay and Paraná, numerous tributaries of which intersect the country. Along the Paraguay and in the south, adjoining the Paraná, are extensive swampy tracts; westward of the Paraguay the country is little known. Elsewhere the surface is well diversified with hill and valley, and rich alluvial plain. The climate is agreeable, the mean annual temperature being about 75°. The natural fertility of the soil is shown by a vegetation of almost unequaled luxuriance and grandeur. In the forests are found at least sixty varieties of timber-tree, besides dyewoods, gums, drugs, perfumes, vegetable oils, and fruits. Many of the hills are covered with the *yerba maté* or Paraguay tea. (See *Maté.*) The larger plains are roamed over by immense herds of cattle, which yield large quantities of hides, tallow, bones, etc.; and on all the cultivated alluvial tracts sugar-cane, cotton, tobacco, rice, maize, etc., are raised in profusion. The exports are mainly Paraguay tea, fruits, tobacco, sugar, hides, rubber, and other native products. Asuncion, the capital, Paraguari, and Villa Rica are connected by a railway about 90 miles long. Large river steamers ascend the Paraná and the Paraguay far above Asuncion.

Paraguay was originally a Spanish colony, the first settlement being made in 1535. In 1608 a number of Spanish Jesuits established a powerful and well-organized government, which lasted till 1758, when it was overthrown by the Brazilians and Spaniards. Early in the nineteenth century its isolated position enabled it by a single effort to emancipate itself from Spanish rule. Dr. Francia, secretary to the revolutionary junta in 1811, was elected consul, but exchanged the name for that of dictator in 1814, and thenceforward, by a rigorous system of espionage and the strict prohibition of all intercourse with other nations, retained his position till his death in 1840 at the age of eighty-four. In 1844 Don Carlos Antonio Lopez was elected president for ten years, and soon after the country was declared free and open both to foreigners and foreign commerce. Don Carlos Lopez remained president of Paraguay till his death in 1862, when he was succeeded by his son Don Francisco, who concluded treaties of commerce with England, France, the United States, Brazil, etc., and did all in his power to promote the growth of agriculture and industry in the land. But a disastrous war with Brazil and the Argentine Republic, which broke out in 1864 and only closed with the death of Lopez in 1870, caused the death of far the greater portion of the male adults and entirely checked the progress of Paraguay. A popular constitutional government has since been established, and the state is now making rapid progress in population and prosperity. The people are largely half-breeds or of Indian blood. Before the war the population is said to have been over 1,000,000; after the war it was not more than a tenth of this. The census of 1886 made it 329,688, not including about 120,000 Indians. Pop., 1905, 631,347.

Paraguay, a river of S. America, which rises in the Brazilian province of Matto Grosso, takes a course generally southwards, and joins the Paraná at the southwest angle of the state of Paraguay after a course of some 1300 miles. It receives the Pilcomayo, Vermejo, and other large rivers, and is a valuable highway of trade to Paraguay and Brazil.

Paraguay Tea. See *Maté.*

Parahyba (pä-rä-ē′bä), a maritime province of Brazil, between Rio-Grande-do-Norte on the north and Pernambuco on the south; area, 28,846 square miles. Much of the soil is of a sandy texture, though there are also extensive fertile tracts and large forests. Periodical droughts occur. Pop. about 600,000. The capital, PARAHYBA, is a cathedral city situated on the river of the same name, about 11 miles from its mouth. The harbor is much frequented by coasting vessels. Pop. (1908) estimate 30,000.

Parakeet (par′a-kēt), or PARROQUET, a subfamily or group of the Parrots, characterized by their generally small size and their long tail-feathers. The islands of the Eastern Archipelago form the chief habitat of these birds, but species also occur in India and Australia. Amongst the most familiar forms are the rose-ringed and Alexandrine parakeets. The former (*Palæornis torquātus*), found in India and on the eastern coasts of Africa, has a bright-green body and a

pink circle round the neck. The Alexandrine parakeet (*P. Alexandri*) of India is a nearly allied species. These birds may be taught to speak with distinctness. The ground parakeets of Australia live amongst the reeds and grass of swamps, generally in solitary pairs. The common ground parakeet of Australia (*Pezoporus formōsus*) possesses a green and black plumage, the tail being similarly colored, and the body-feathers

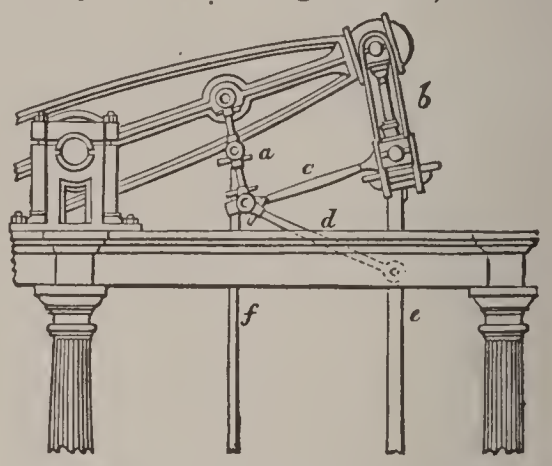
Rose-ringed Parakeet (*Palæornis torquātus*).

having each a band of dark-brown hue. The grass parakeets of Australia, of which the small warbling parakeet (*Melopsittăcus undulātus*) is a good example, inhabit the central flat lands of Australia, and feed on the seeds of the grasses covering the plains. They perch on the eucalypti or gum-trees during the day, and the nests are situated in the hollows of these trees. Contrary to most parrots, they have an agreeable voice.

Parallax (par'a-laks), the apparent change of place which bodies undergo by being viewed from different points. Thus an observer at A sees an object B in line with an object C, but when he moves to D it is in line with E, and seems to have gone backwards. The term has become technical in astronomy, and implies the difference of the apparent positions of any celestial object when viewed from the surface of the earth and from the center of either the earth or the sun. The term 'parallax' is also employed to denote the non-coincidence of the crossfibers in a telescope with the focus of the eyeglass.

Parallel Lines (par'el-el), in geometry, straight lines in the same plane which never meet, no matter how far produced.

Parallel Motion, a mechanical contrivance employed by Watt to communicate the alternate pushes and pulls of the piston-rod of a steam engine to the end of a vibrating beam, and which prevents the action of forces tending to destroy the right-line motion of the piston-rod. The motion given to the end of the rod is not accurately in a straight line, but it is very nearly so. Watt's parallel motion is still employed in all stationary beam-engines. In marine beam-engines the arrangement employed differs somewhat in form, but is the same in principle as Watt's contrivance.



Part of Beam of Condensing Engine. *a b c d*, Parallel motion. *e*, Piston-rod. *f*, Pump-rod.

Parallelogram of Forces, an important dynamical principle, deduced by Newton, which may be stated thus: If two forces acting in different directions on a particle at the same time be represented in magnitude and direction by two straight lines meeting at the particle, their resultant effect in giving motion to the particle is that of a force represented in magnitude and direction by the diagonal (terminating in the particle) of the parallelogram, of which the two former lines are two sides.

Parallels, in military operations, are trenches formed by besiegers to cover their assault, being so named because they generally run parallel with the outlines of the fortress assailed. The communication from one to the other is effected by means of ditches formed in zigzag, so that they may not be raked by the fire of the fortress. Vauban first made use of them in 1673, at the siege of Maestricht.

Parallels of Latitude. See *Latitude.*

Paralysis (pa-ral'i-sis), a bodily ailment, which in its effect consists in loss of power in moving or loss of feeling, or in both, and it is caused by disease of the brain, spinal cord, or nerves, or it may be due to lead or other poison affecting some part of the nervous system. When the paralysis is limited to one side of the body, and the voluntary power of moving the muscles is lost, this is due to disease of the brain which is of a one-sided or localized character, and receives the specific name of *hemiplegia*. It is generally caused by the bursting of a blood-vessel in the brain; it may also be due to a blood-vessel being blocked by a clot of blood. The paralysis may be sudden and without unconsciousness, or it may be gradual and attended with sickness, faintness, and confusion of mind. In ordinary cases it will be found that one side of the body is powerless, the face twisted, the speech thick and indistinct. Recovery may be complete or partial, or the attack may prove fatal. In any case the shock is apt to be repeated. When one side of the body and the opposite side of the face are affected, the disease, which has its seat in the region of the medulla oblongata, receives the name of *crossed paralysis*, and is considered more dangerous than ordinary hemiplegia. When, again, the disease is situated in the spinal cord, the paralysis, which receives the name of *paraplegia*, may affect either the upper or lower part of the body, or motion may be lost on one side and sensation on the other. *Local paralysis* or *paresis* is the term used when disease or injury affects a specific nerve-trunk, and has no connection with disease of the brain or spinal cord. The effect of this local paralysis is to deprive the muscles of their nerve-supply, in which case they lose their power, becoming weak and faint.

Paramaribo (par-a-mar'i-bō), the capital of Dutch Guiana or Surinam, about 18 miles above the mouth of the River Surinam, which is navigable for vessels of considerable size. It is the center of the Dutch West Indian trade, and exports sugar, coffee, etc. Pop. 33,821.

Paramatta (par-a-mat'a), or PARRAMATTA, a town in New South Wales, on a river of same name (really an extension of Port Jackson), in a beautiful and well-cultivated district, 14 miles west of Sydney. Woolen cloth is manufactured to some extent; and in the vicinity there are large salt-works and copper-smelting furnaces. Much fruit is grown in the district. The town is oldest in the colony except Sydney. Pop. 12,568.

Paramatta, a light, twilled fabric with a weft of combed merino wool and cotton warp. It was invented at Bradford, in Yorkshire, where it is still largely manufactured.

Paraná (pä-rȧ-nä'), a river in South America, the largest except the Amazon, and draining a larger basin than any other river in the New World except the Amazon and the Mississippi. It is formed by the junction of two streams, the Rio Grande and the Paranahyba, which meet in Brazil, and it discharges itself into the estuary of the La Plata, its final course being through the Argentine Republic. Its principal tributaries are the Paraguay and the Salado, both from the right. All the tributaries on its left are comparatively short. Its length, from its sources to its junction with the Paraguay, is probably 1500 miles and thence to the sea 600 miles more. In breadth, current, and volume of water, the Paraná has ten times the magnitude of the Paraguay, which is itself superior to the greatest European rivers. It is an important waterway to the interior of the country, though with obstructions at certain points.

Paraná, a province of Southern Brazil, having on the north the province of São Paulo, east the Atlantic, south the province of Santa Catharina, and west Paraguay and the province of Matto Grosso; area, 85,429 square miles. Its chief town is Curitiba. Pop. [illegible] 327,136.

Paranahyba (pȧ-rȧ-nȧ-ē'bȧ), one of the head streams of the River Paraná (which see).

Parapet (par'a-pet), in fortification, a work, usually of earth, intended to protect the troops within the ramparts, as well as the pieces of artillery used in the defense. In order to fire, the defenders ascend a ledge called a banquette, about half-way up the parapet. In architecture the term parapet is applied to the structures placed at the edges of platforms, balconies, roofs of houses, sides of bridges, etc., to prevent people from falling over.

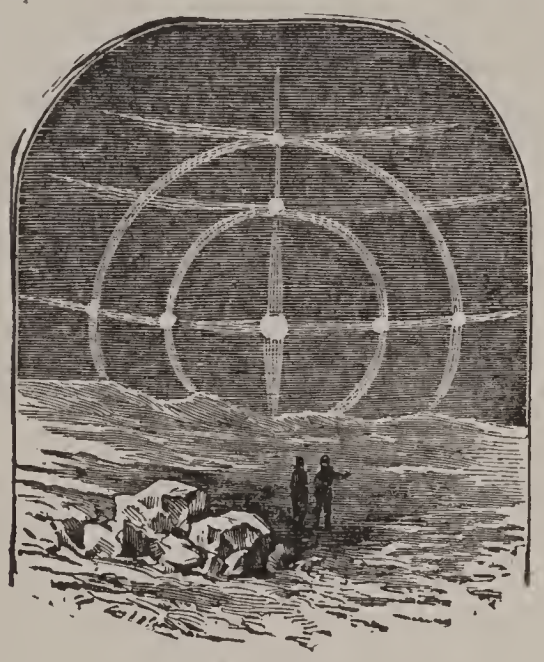
Paraphernalia (par-a-fėr-nā'li-a), in law, a woman's apparel, jewels, and other things, which, in the lifetime of her husband, she wore as the ornaments of her person, and to which she has a distinct claim.

Paraple'gia. See *Paralysis*.

Parasang (par'a-sang), a Persian measure of distance used both in ancient and modern times. Its

modern Persian name is *ferseng*, and its length is estimated at from 3½ to 4 English miles.

Paraselene (pa-ra-se-lē′nē), a luminous ring or circle sometimes seen round the moon, or there may be more than one ring as well as certain



Paraselenæ.

bright spots, bearing some resemblance to the moon. Paraselenæ or mock moons are analogous to parhelia or mock suns. See *Parhelion.*

Parasite (par′a-sīt), the name applied to animals which attach themselves to the exterior, or inhabit various situations in the interior, of the bodies of other animals, including such forms as tapeworms, flukes, scolices or hydatids, fish-lice, bird-lice, common lice, etc. True parasites obtain their nourishment from the animals on which they live, but there is another class of parasites that only obtain a lodging or abode at the expense of the animals they accompany. See *Commensal.*

Parasitic Diseases (par-a-sit′ik), such as are produced by parasitic animals or plants. Among the animals producing such diseases are the guinea-worm, the louse, the trichina, tapeworms, etc. The vegetable parasites which produce disease in animals are either fungi or algæ. Ringworm is an example of this class of diseases.

Parasitic Plants, such plants as grow on others, from which they receive their nourishment. In this class are many fungi, such as the *Urēdo caries*, which produces the formidable disease called bunt to which wheat is liable. Among larger parasites are the mistletoe; and the genus *Rafflesia*, belonging to Sumatra and Java. Parasites are distinguished from *epiphytes*, inasmuch as the latter, though they grow upon other plants, are not nourished by them. See *Epiphyte.*

Parasol (par′a-sol), a small umbrella used as a sunshade.

Paray le Monial (pà-rā le mō-nyal′), a town of France, dep. Saône-et-Loire, a common place of pilgrimage, as the place where the holy nun Marie Alacoque died in 1690. Pop. (1906) 3382.

Parbuckle (par′buk′l), a method of raising or lowering any cylindrical body, such as a barrel, by an inclined plane and a rope, the rope being doubled, the double placed round a post at the top of the plane, and the ends passed under and round the object to be raised or lowered, when by pulling or slackening this can be accomplished.

Parcels Post (pär′selz pōst), a plan long discussed in the United States and finally adopted in 1912. The measure adopted provides for the transmission by mail of packages to the limit of eleven pounds, at a rate varying with the distance.

Parchim (pàr′*h*ēm), a town of Germany, in the Grand-duchy of Mecklenburg-Schwerin, on the Elbe, 21 miles southeast of Schwerin. It has manufactures of woolen cloth; flour, oil, paper and saw mills, etc. It is the birthplace of Count von Moltke. Pop. 10,397.

Parchment (parch′ment), the skins of sheep, she-goats, and several other animals, so dressed or prepared as to be rendered fit for writing on. This is done by stretching the skin on a frame, separating all the flesh and hair from the skin, reducing its thickness with a sharp instrument, and smoothing the surface with pumice-stone covered with pulverized chalk or slaked lime. After it is reduced to something less than half its original thickness, it is smoothed and slowly dried for use.

Pardoe (par′dō), JULIA, novelist and historian, born at Beverly, England, in 1806; died in 1862. She wrote numerous novels, descriptions of life in Constantinople and Hungary, and works dealing with French history.

Pardon (par′dun), the remission of the penalty of a crime or offense. In England, in nearly all cases of crimes except where there is an impeachment, a pardon from the crown may be granted before a trial as well as after; and it stops further progress in the inquiry and prosecution at whatever time it is granted. In cases of impeachment no pardon can now be granted by the

crown while the prosecution is pending; but after conviction of the offender it may be granted as in other cases. In the United States the pardoning power is lodged in the President, and the Governors of most of the States, and extends to all offenses except those which are punished by impeachment after conviction. In some States concurrence of one of the legislative bodies or of a Pardoning Board is required.

Pardubitz (pär'du-bitz), a town of Bohemia, on the Elbe. It has an interesting old castle, has various industries, and is a place where large horse-fairs are held. Pop. 17,029.

Paré (på-rā), AMBROISE, the father of French surgery, born early in the sixteenth century at Laval; studied at Paris. He acted for a time as an army-surgeon, and in 1552 he became surgeon to Henry II, under whose successors (Francis II, Charles IX, and Henry III) he held the same post. From this it was said that 'Paré was a legacy of the crown.' He died in 1590.

Paregoric Elixir (par-a-gor'ik), known also as the camphorated tincture of opium, is a solution of powdered opium, camphor, benzoic acid, and oil of anise. When used carefully it is found to be an excellent anodyne and antispasmodic, but produces deleterious effects that must be guarded against.

Pareira (pa-rī'ra), a Portuguese name given to the roots of certain plants employed in medical practice, as valuable tonics and diuretics. The sort admitted into the pharmacopœia is called *Pareira brava*, and is produced by *Cissampelos Pareira*, nat. order Menispermaceæ.

Pareja (på-rā'*h*å), JUAN DE, a Spanish painter, 'the slave of Velasquez,' born of West Indian parents at Seville in 1606; died in 1670. In early life he was employed in menial work in the studio of Velasquez, and by closely watching his methods attained considerable skill secretly. At the intercession of Philip IV he obtained his freedom, but continued in the family of Velasquez till his death. His success was chiefly in portraits, but he also painted several large pictures closely imitative of the style of his master.

Parent and Child, besides being a natural relationship, has its legal aspects, in which legitimacy and illegitimacy form a clear distinction. Various laws govern the relation in different countries, and in the United States it is generally held that the right of protection and support due from a parent to a child is dependent on general principles of the common law, as well as of morality, statutory provisions existing in most of the states. The reciprocal rights of parent and child cease when the child has attained his majority; but may be revived on either side: thus if an adult child become a pauper the parent becomes responsible for its support, and if the parent become a public burden the adult child is responsible. The parent can leave his property away from his children. The right to the custody of the child belongs to both parents; the child's preference being consulted if he is 14 years old or over, and if not the court may use its discretion. The father may collect his child's earnings, and sue for damages for loss of services from injuries inflicted by a third party. An action may be brought by the child when the parent is killed through another's negligence. The mother and putative father of an illegitimate child are liable for its support.

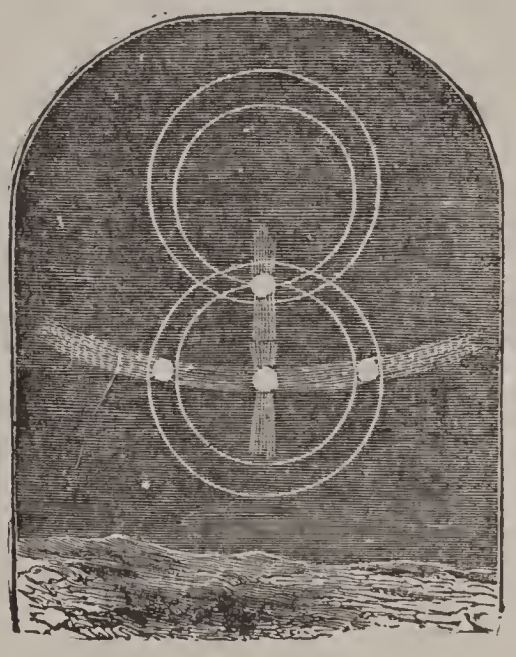
Pargetting (par'jet-ing), PARGE-WORK, a term used for plaster-work of various kinds, but commonly applied to a particular sort of ornamental plaster, with patterns and ornaments raised or indented upon it, much used in the interior and often in the exterior of houses of the Tudor period. Numbers of wooden houses so ornamented on the outside, and belonging to the time of Queen Elizabeth, are still to be met with.

Parepa-Rosa, MADAME EUPHROSYNE, a distinguished vocalist and actress, born at Edinburgh in 1835; died in 1874. She made her first appearance as *Amina* when sixteen years old. Her voice had extraordinary compass and power, and she sang with brilliant success in London, New York, Philadelphia and Boston. She married Carl Rosa, her manager, in 1867.

Paresis (pa-rē'sis), a partial paralysis, or loss of muscular motion, but not of sensation. It is less marked in its effect than full paralysis, but is of the same nature. The loss of motor power is progressive and likely to end in death in from one to three years.

Parhelion (par-hē'li-on), a mock sun, having the appearance of the sun itself, and occasionally seen by the side of that luminary. Parhelia are sometimes double, sometimes triple, and sometimes more numerous. They appear at the same height above the horizon as the true sun, and they are always connected with one another by a white circle or halo. They are the result of certain modifications which light undergoes when it falls on the crystals of ice, rain-drops,

or minute particles that constitute suitably situated clouds. Parhelia which appear on the same side of the circle with



Parhelia.

the true sun are often tinted with prismatic colors.

Paria (pä′ri-a), GULF OF, an inlet of the Atlantic on the northeast coast of South America, between the island of Trinidad and mainland of Venezuela, enclosed on the north by the Peninsula of Paria. It possesses good anchorage, and receives some arms of the Orinoco.

Pariah (pā′ri-a), a name somewhat loosely applied to any of the lowest class of people in Hindustan, who have, properly speaking, no caste; hence, one despised and contemned by society; an outcast. Properly, however, Pariah (a Tamil name) is applied to the members of a somewhat widely spread race in Southern India, generally of the Hindu religion, and though regarded by the Hindus as of the lowest grade, yet superior to some ten other castes in their own country. They are frequently serfs to the agricultural class, or servants to Europeans.

Parian Chronicle. See *Arundelian Marbles.*

Parian Marble (pā′ri-an), a mellow-tinted marble, highly valued by the ancients, and chosen for their choicest works. The principal blocks were obtained from Mount Marpassus, in the island of Paros.

Parima (pa-rē′ma), or PARIME, SIERRA, a mountain range situated in the N. E. of Venezuela. In general it is composed of bare plateaus, and its highest peaks rise to a height of about 8000 ft. The Essequibo, Orinoco, and Rio Branco have their rise in this range.

Parini (pa-rē′nē), GIUSEPPE, an Italian poet, born in 1729; died in 1799. He studied at Milan, published some youthful poetry, and wrote a dramatic satire on the Milanese aristocracy entitled *Il Giorno* ('The Day'). He was latterly professor of rhetoric at Milan.

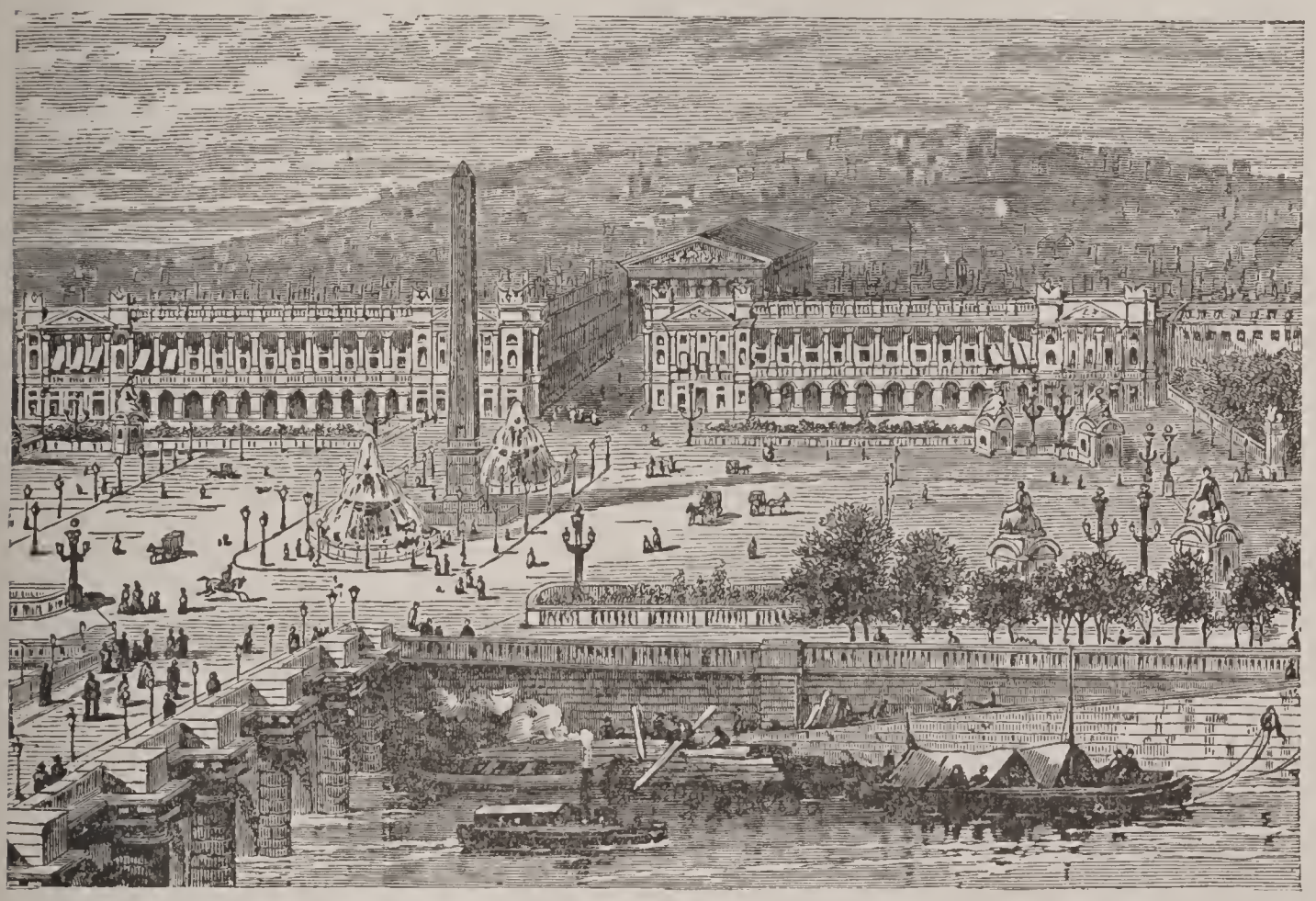
Pari passu, in law, a term signifying equally in proportion, without preference: used especially of the creditors of an insolvent estate who (with certain exceptions) are entitled to payment of their debts in shares proportioned to their respective claims.

Paris (par′is), a genus of plants of the nat. order Trilliaceæ. *P. quadrifolia* (herb-paris, true-love, or one-berry) is not uncommon in Britain, being found in moist, shady woods. It has a simple stem bearing a whorl of four ovate leaves near the summit, and a solitary greenish flower. The fruit is a purplish-black berry.

Paris (pa′ris, Fr. pron. på-rē′; anciently, *Lutetia Parisiorum*), the capital of France and of the department of the Seine. The city lies in the Seine valley surrounded by heights, those on the north being Charonne La Villette, the Buttes-Chaumont and Montmartre; those on the south St. Geneviève, Montrouge and the Butte-aux-Cailles. Through the valleys between these heights the river runs from east to west, enclosing two islands, upon which part of the city is built. It is navigable by small steamers. The quays or embankments, which extend along the Seine on both sides, being built of solid masonry, protect the city in some measure from inundation and form excellent promenades. The river, which within the city is fully 530 ft. in width, and has a length of 7 miles, is crossed by numerous bridges, the more important being Pont Neuf, Pont des Arts, Pont du Carrousel, Pont Royal, Pont de l'Alma, etc. The city is surrounded by a line of fortifications which measures 22 miles; outside of this is the enceinte, while beyond that again are the detached forts. These now form two main lines of defense. The inner line consists of sixteen forts, the outer line of 18 forts besides redoubts; the area thus enclosed measuring 430 square miles, with an encircling line of 77 miles. The climate of Paris is temperate and agreeable. The city is divided into twenty arrondissements, at the head of each of which is a *maire.* Each arrondissement is divided into four quarters, each of which sends a member to the municipal

council. The council discusses and votes the budget of the city. At the head are the prefect of the Seine and the prefect of police. The water supply of the city is derived from the Seine and the Marne, from the Ourcq Canal, from artesian wells, and from springs.

Streets, Boulevards, etc.— The houses of Paris are almost all built of white calcareous stone, and their general height is from five to six stories, arranged in separate tenements. Many of the modern street buildings have mansard roofs, and are highly enriched in the Renaissance manner. In the older parts of the city the streets are narrow and irregular, but in the newer districts the avenues are straight, wide, and well paved. What are known as 'the boulevards' include the interior, exterior, and military. That which is specifically called *The Boulevard* extends, in an irregular arc on the north side of the Seine, from the Place de la Bastille in the east to the Place de la Madeleine in the west. It includes the Boulevards du Temple, St. Martin, St. Denis, des Italiens, Capuchins, Madeleine, etc., and its length of nearly 3 miles forms the most stirring part of the city. Here may be noted also the magnificent triumphal arches of Porte St. Denis and Porte St. Martin, the former of which is 72 feet in height. On the south side of the Seine the boulevards are neither so numerous nor so extensive, the best known being the Boulevard St. Germain, which extends from Pont Sully to the Pont de la Concorde. The exterior boulevards are so named because they are outside the old *mur d'octroi;* and the military boulevards, still farther out, extend round the fortifications. After the boulevards the most famous line of streets is the Rue de Rivoli, with its somewhat irregular extension in the magnificent Champs Elysées. A second is the Avenue de la Grande Armée and the Rue St. Antoine. These traverse a great part of the city from S.E. to N.W. The Champs Elysées, a driveway about $1\frac{1}{3}$ miles long, and the Avenue du Bois de Boulogne constitute the most fashionable promenades of the city. Other important streets are the Rue Castiglione, Rue de la Paix, Rue de la Chaussée d'Antin, the Rue des Pyramides, and the twelve fine avenues radiating from the Place de l'Etoile. There are six passenger stations for the railways to the various parts of the country, and a railway around the city (the *ceinture*), by means of which interchange of traffic between the differ-

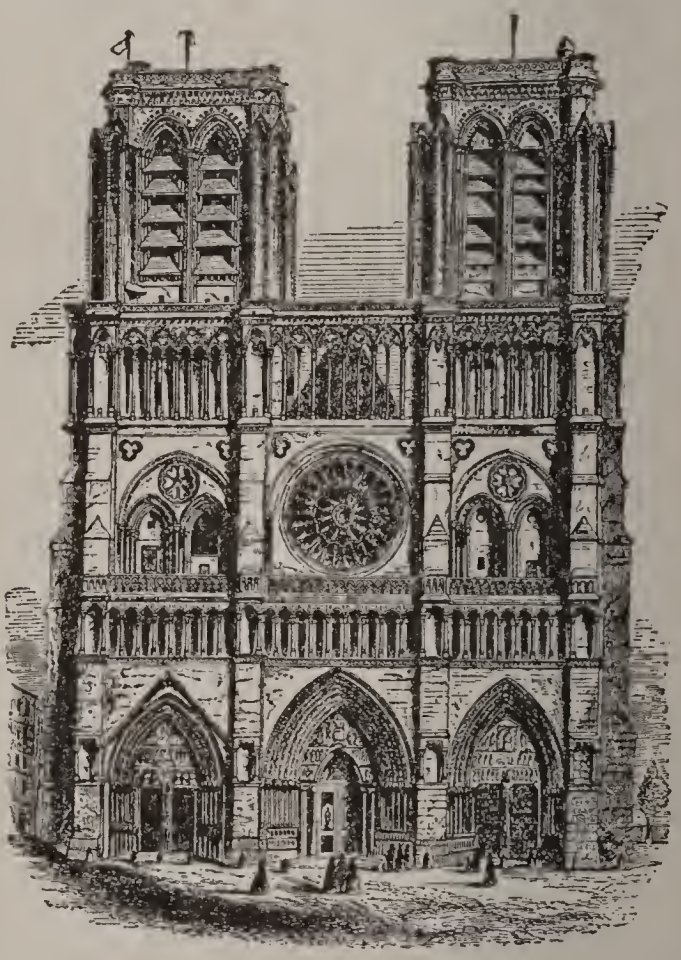


PARIS.— The Place de la Concorde and Montmartre, from the Chamber of Deputies.

ent lines is effected. There are also tramway lines to Versailles, St. Cloud, and other places in the suburbs.

Squares, Parks, etc.— The most notable public squares or *places* are the Place de la Concorde, one of the largest and most elegant squares in Europe, surrounded by fine buildings and adorned by an Egyptian obelisk, fountains, and statues; Place de l'Étoile, in which is situated the Arc de Triomphe, a splendid structure 152 feet in height; the Place Vendôme, with column to Napoleon I; Place des Victoires, with equestrian statue of Louis XIV; Place de la Bastille, with the Column of July; Place de la République, with colossal statue of the Republic, etc. Within the city are situated the gardens of the Tuileries, which are adorned with numerous statues and fountains; the gardens of the Luxembourg, in which are fine conservatories of rare plants; the Jardin des Plantes, in which are the zoölogical gardens, hothouses, museums, laboratories, etc., which have made this scientific institution famous; the Buttes-Chaumont Gardens, in which an extensive old quarry has been turned to good account in enhancing the beauty of the situation; the Parc Monceaux; and the Champs Élysées, the latter being a favorite holiday resort of all classes. But the most extensive parks are outside the city. Of these the Bois de Boulogne, on the west, covers an area of 2150 acres, gives an extensive view towards St. Cloud and Mont Valérien, comprises the race-courses of Longchamps and Auteuil, and in it are situated lakes, an aquarium, conservatories, etc. The Bois de Vincennes, on the east, even larger, is similarly adorned with artificial lakes and streams, and its high plateau offers a fine view over the surrounding country. The most celebrated and extensive cemetery in Paris is Père la Chaise (106½ acres), finely situated and having many important monuments. The Catacombs are ancient quarries which extend under a portion of the southern part of the city, and in them are deposited the bones removed from old cemeteries now built over.

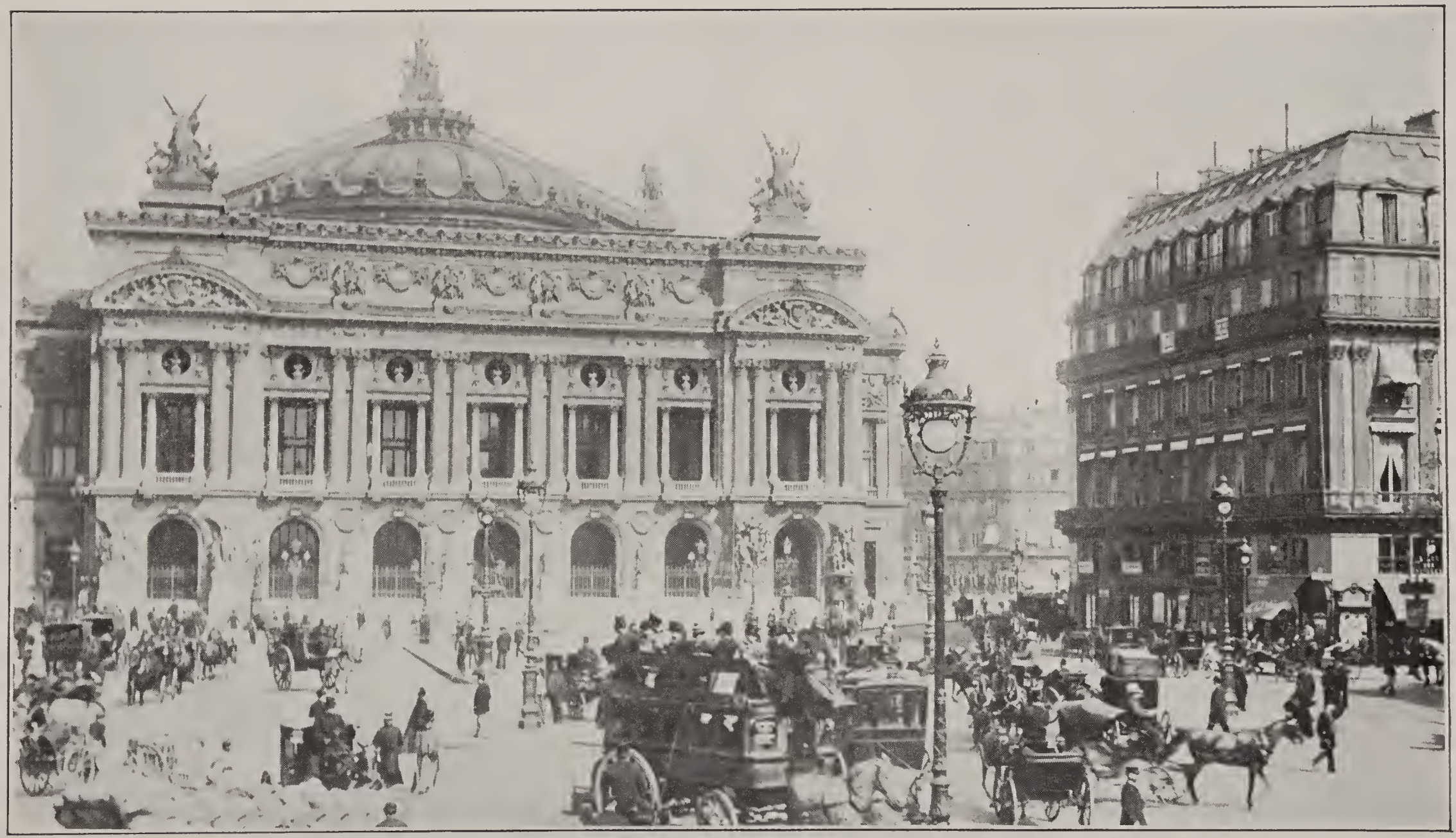
Churches.— Of the churches of Paris the most celebrated is the Cathedral of Nôtre Dame, situated on one of the islands of the Seine, called the Île de la Cité. It is a vast cruciform structure, with a lofty west front flanked by two square towers, the walls sustained by many flying buttresses, and the eastern end octagonal. The whole length of the church is 426 feet, its breadth 164 feet, The foundation of Nôtre Dame belongs to the sixth century; the present edifice dates from 1163; but was restored in 1845. The interior decorations are all modern. The Church of La Madeleine, a modern structure in the style of a great Roman temple, entirely surrounded by massive Corinthian columns, stands on an elevated basement fronting the north end of the Rue Royale; the Church of St. Geneviève, built about the close of the eighteenth century, was after its completion set apart, under the title of the Panthéon, as the burying-place of illustrious Frenchmen; St. Eustache (1532-1637), a strange mixture of degenerate Gothic and Renaissance architecture; St. Germain l'Auxerrois, dating from the fifteenth and sixteenth centuries; St. Gervais; St. Roch; St. Sulpice; Nôtre Dame de Lorette; St. Vincent de Paul, etc. On



The Cathedral of Nôtre Dame, Paris.

the very summit of Montmartre is the Church of the Sacred Heart, a vast structure in mediæval style. The Protestant churches are the Oratoire and Visitation, and chapels belonging to English, Scotch, and American denominations. There are also a Greek chapel and several synagogues.

Palaces and Public Buildings.— Notable among the public buildings of Paris are its palaces. The Louvre, a great series of buildings within which are two large courts, is now devoted to a museum



THE GRAND OPERA HOUSE AND PLACE DE L'OPERA, PARIS

The largest theatre building in the world. It occupies a site specially prepared for it just off the grand boulevard covering an area of nearly three acres. The site alone cost more than $2,000,000 and the building about $7,500,000. It was begun in 1861 and finished in 1875.

which comprises splendid collections of sculpture, paintings, engravings, bronzes, pottery, Egyptian and Assyrian antiquities, etc. (see *Louvre*) ; the palace of the Tuileries, the main front of which was destroyed in 1871 by the Communists, has since been restored, with the exception of its principal façade, the ruins of which have been removed and its site converted into a garden; the Palais du Luxembourg, on the south side of the river, has very extensive gardens attached to it, and contains the Musée du Luxembourg, appropriated to the works of modern French artists; the Palais Royal (which see), is a famed resort; the Palais de l'Élysées, situated in the Rue St. Honoré, with a large garden, is now the residence of the president of the republic; the Palais du Corps Législatif, or Chambre des Députés, is the building in which the chamber of deputies meets; the Palais de l'Industrie, built for the first international exhibition in 1855, is used for the annual *salon* of modern paintings, etc. The Hôtel de Ville is situated in the Place de l'Hôtel de Ville, formerly Place de Grève, on the right bank of the river. It was destroyed by the Communists in 1871, but has now been reërected on the same site with even greater magnificence. It is a very rich example of Renaissance architecture. The Hôtel des Invalides, built in 1670, with a lofty dome, is now used as a retreat for disabled soldiers and is capable of accommodating 5000. It contains the burial place of the first Napoleon. The Palais de Justice is an irregular mass of buildings occupying the greater part of the western extremity of the Île de la Cité. Opposite the Palais de Justice is the Tribunal de Commerce, a quadrangular building enclosing a large court roofed with glass. The Mint (Hôtel des Monnaies) fronts the Quai Conti, on the south side of the Seine, and contains an immense collection of coins and medals. The other principal government buildings are the Treasury (Hôtel des Finances), in the Rue de Rivoli; the Record Office (Hôtel des Archives Nationales). The Exchange (La Bourse) was completed in 1826; it is in the form of a parallelogram, 212 feet by 126 feet, surrounded by a range of sixty-six columns. A distinctive feature are the extensive markets, among the most important of which are the Halles Centrales, where fish, poultry, butcher-meat and garden produce are sold. A notable and unique structure is the Eiffel Tower, built in connection with the Paris Exhibition of 1889, and which is to have a kind of permanent existence. It is a structure of iron lattice-work 984 feet high, and having three stages or platforms. It is as yet the highest structure in the world.

Education, Libraries, etc.— The chief institution of higher education is the academy of the Sorbonne, where are the university 'faculties' (see *France*, section *Education*) of literature and science, while those of law and of medicine are in separate buildings. There are, besides, numerous courses of lectures in science, philology, and philosophy delivered in the Collège de France, and courses of chemistry, natural history, etc., in the museum of the Jardin des Plantes. Among other Parisian schools are the secondary schools or lycées, the most important of which are Descartes (formerly Louis le Grand), St. Louis, Corneille (formerly Collège Henri IV), Charlemagne, Fontanes (formerly Condorcet), De Vanves; the École Polytechnique for military and civil engineers, etc.; Ecole des Beaux Arts; School of Oriental Languages; Conservatoire des Arts et Métiers, and the Conservatoire de Musique. Of the libraries the most important is the Bibliothèque Nationale, the largest in the world. The number of printed volumes which it contains is estimated at 2,500,000, besides 3,000,000 pamphlets, manuscript volumes, historical documents, etc. The other libraries are those of the Arsenal, St. Geneviève, Mazarin, De la Ville, De l'Institut, and De l'Université (the Sorbonne). There are also libraries subsidized by the municipality in all the arrondissements. Among museums, besides the Louvre and the Luxembourg, there may be noted the Musée d'Artillerie, in the Hôtel des Invalides, containing suits of ancient armor, arms, etc.; the Conservatoire des Arts et Métiers; the Trocadéro Palace, containing curiosities brought home by French travelers, casts from choice specimens of architecture, etc.; the new palaces of the Fine Arts, erected 1897-1900; and the Cluny Museum, containing an extensive collection of the products of the art and artistic handicrafts of the middle ages. The chief of the learned societies is the Institute of France (which see).

Hospitals, etc.— There are many hospitals in Paris devoted to the gratuitous treatment of the indigent sick and injured; and also numerous establishments of a benevolent nature, such as the Hôtel des Invalides, or asylum for old soldiers, the lunatic asylum (Maison des Aliénés, Charenton), blind asylums; the deaf and dumb institute (Institution des Sourds-Muets) ; two hospitals at Vincennes for

wounded and convalescent artisans; the *crèches*, in which infants are received for the day at a small charge; and the *ouvroirs*, in which aged people are supplied with work.

Theaters.— The theaters of Paris are more numerous than those of any other city in the world. The most important are the Maison de l'Opéra, a gorgeous edifice of great size; the Opéra Comique, the Théâtre Français, the Odéon; the Théâtre de la Gaîté, for vaudevilles and melodramas; Théâtre des Folies Dramatiques, Théâtre du Châtelet, Théâtre du Vaudeville, Théâtre des Variétés, Théâtre de la Porte St. Martin, and the Théâtre de l'Ambigu Comique.

Industries and Trade.— The most important manufactures are articles of jewelry and the precious metals, trinkets of various kinds, fine hardware, paperhangings. saddlery and other articles in leather. cabinet-work, carriages, various articles of dress, silk and woolen tissues, particularly shawls and carpets, Gobelin tapestry. lace, embroidery, artificial flowers. combs, machines, scientific instruments, types, books, engravings, refined sugar, tobacco (a government monopoly), chemical products, etc. That which is distinctively Parisian is the making of all kinds of small ornamental articles, which are called *articles de Paris*. A large trade is carried by the Seine both above and below Paris as well as by canals.

Population.— According to approximate estimates, the population of Paris was, in 1474, 150,000; under Henry II (1547-59), 210,000; in 1590, 200,000; under Louis XIV (1643-1715), 492,600; in 1856 (before the annexation of the parts beyond the old *mur d'octroi*), 1,174,346; 1861 (after the annexation), 1,667,841; 1881, 2,269,023; 1886, 2,256,050; 1901, 2,714,068; 1906, 2,763,393.

History.— The first appearance of Paris in history is on the occasion of Cæsar's conquest of Gaul, when the small tribe of the Parisii were found inhabiting the banks of the Seine, and occupying the island now called Île de la Cité. It was a fortified town in 360 A.D., when Julian's army encamped here summoned him to fill the imperial throne. In the beginning of the fifth century it suffered much from the northern hordes, and ultimately fell into the hands of the Franks, headed by Clovis, who made it his capital in 508. In 987 a new dynasty was established in the person of Hugo Capet, from whose reign downwards Paris has continued to be the residence of the kings of France. In 1437 and 1438, under Charles VII, Paris was ravaged by pestilence and famine, and such was the desolation that wolves appeared in herds and prowled about the streets. Under Louis XI a course of prosperity again commenced. In the reign of Louis XIV the Paris walls were leveled to the ground after having stood for about 300 years, and what are now the principal boulevards were formed on their site (1670). Only the Bastille was left (till 1789), and in place of the four principal gates of the old walls, four triumphal arches were erected, two of which, the Porte St. Denis and Porte St. Martin, still stand. Many of the finest edifices of Paris were destroyed during the Revolution, but the work of embellishment was resumed by the directory, and continued by all subsequent governments. The reign of Napoleon III is specially noteworthy in this respect; during it Paris was opened up by spacious streets and beautified to an extent surpassing all that had hitherto been effected by any of his predecessors. The most recent events in the history of Paris are the siege of the city by the Germans in the war of 1870-71, and the subsequent siege carried on by the French national government in order to wrest the city from the hands of the Commune. Paris has been the scene of international exhibitions in 1855, 1867, and 1878, but the most important was that of 1889 in commemoration of the centenary of the French Revolution. In 1900 was held the Exposition Universelle, at which Americans secured the greater part of the foreign awards. A great inundation, due to an almost unprecedented flood in the Seine, submerged a great part of the city in 1910, causing immense damage to property.

Paris (par'is), a city, capital of Edgar County, Illinois, 36 miles s. of Danville. It has manufactures of lumber, flour, glass, etc., and railroad car shops. Pop. 7664.

Paris, a city, capital of Bourbon Co., Kentucky, on Stover Creek, 19 miles N. E. of Lexington. Its industries include whisky, tobacco, live stock and blue-grass seed. Pop. 5859.

Paris, a city, capital of Lamar Co., Texas, on the Texas Pacific and other railroads, 64 miles E. of Sherman. It has cotton gins and compresses, cottonseed oil mills, etc. Pop. 11,269.

Paris, in Greek mythology, also called ALEXANDER, the second son of Priam, king of Troy, by Hecuba. His mother dreamed before his birth that she had brought forth a firebrand, which was interpreted to mean that he would cause the destruction of Troy. To prevent this

the child was exposed on Mount Ida, where he was discovered by a shepherd, who brought him up as his own son. Here his grace and courage commended him to the favor of Œnone, a nymph of Ida, whom he married. At the marriage of Peleus and Thetis a dispute arose whether Hera, Athena, or Aphroditē was the most beautiful, and as such entitled to the golden apple. Paris was chosen judge, and decided in favor of Aphroditē, who had promised him the fairest woman in the world for his wife. Subsequently he visited Sparta, the residence of Menelaus, who had married Helena (or Helen), the fairest woman of the age, whom he persuaded to elope with him. This led to the siege of Troy, at the capture of which city Paris was killed by an arrow.

Paris, Louis Albert Philippe d'Orléans, Comte de, son of the Duc d'Orleans, and grandson of Louis Philippe, born in 1838. After the revolution of 1848 he resided chiefly in Claremont, England, where he was educated by his mother. During the American Civil war of 1861 he, along with his brother the Duc de Chartres, volunteered into the northern army, and served for some time on the staff of General McClellan. On his return to Europe the following year he married his cousin the Princess Marie Isabelle, eldest daughter of the Duc de Montpensier. After the Franco-German war he was admitted a member of the first national assembly. The Comte de Paris was recognized by the royalists as head of the royal house of France. Under the expulsion bill of 1886 he, along with the other princes, was forbidden to enter France. He published a *History of the Civil War in America*, and a work on *English Trade-unions*. He died in England in 1894.

Paris, Matthew, an English historian, born about 1195; died in 1259. He entered the Benedictine monastery of St. Albans, and in 1235 succeeded Roger of Wendover as chronicler to the monastery. He was very intimate with Henry III, and had a large number of influential friends besides. In 1248 he went on an ecclesiastical mission to Norway. He is characterized as at once a mathematician, poet, orator, theologian, painter, and architect. His principal work is his *Historia Major* (or *Chronica Majora*), written in Latin, and comprising a sketch of the history of the world down to his own times, the latter portion (1235-59) being, however, the only part exclusively his; the *Historia Anglorum*, called also *Historia Minor*, a sort of abridgment of the former; and also *Lives of the Abbots of St. Albans, Kings of Mercia*, etc.

Paris, Treaties of. Of the numerous treaties bearing this designation a few only of the most important can be mentioned here. On February 10, 1763, a treaty of peace was signed between France, Spain, Portugal, and England, in which Canada was ceded to Great Britain. On February 6, 1778, was signed that between France and the United States, in which the independence of the latter country was recognized. A treaty was signed between Napoleon I and the allies, ratified April 11, 1814, by which Napoleon was deposed and banished to Elba. The treaty for the conclusion of peace between Russia, on the one hand, and France, Sardinia, Austria, Turkey, and Great Britain, on the other, at the end of the Crimean war, was ratified March 30, 1856. The treaty of peace with Germany, at the end of the Franco-German war, May 10, 1871, by which France lost a great part of her Rhine provinces. The treaty of peace between the United States and Spain in 1899, by which Spain lost her colonial possessions in the West Indies and the Pacific.

Paris, University of, came into existence in the beginning of the thirteenth century, and was long the most famous center of learning in Europe. It was suppressed by a decree of the Convention in 1793.

Paris Basin, in geology, the great area of tertiary strata on which Paris is situated. Besides a rich fossil fauna of marine and freshwater mollusca, the remains of mammals are abundant and interesting from their affinity to living forms.

Paris Blue, a bright blue obtained by exposing rosaniline, aniline and some benzoic acid to a temperature of 180° C.

Paris Green, a preparation of copper and arsenic employed on artificial flowers, in wall-papers, and as an insecticide on plants.

Parish (par'ish), a district marked out as that belonging to one church, and whose spiritual wants are to be under the particular charge of its own minister; or, to give the sense which the word often has in acts of Parliament, a district having its own offices for the legal care of the poor, etc. Parishes have existed in England for more than a thousand years. They were originally ecclesiastical divisions, but now, in England especially, a parish is an important subdivision of the country for purposes of local self-government, most of the local rates and taxes being confined within that

area, and to a certain extent self-imposed. In Scotland the division into parishes was complete about the beginning of the thirteenth century, and this division is also recognized for certain civil purposes as well as for purposes purely ecclesiastical. In the United States a parish is a body of people united in one church organization. In Louisiana the counties are called parishes.

Parish Clerk is an officer in the Church of England, whose principal duties are to read the responses to the minister. The appointment is generally made by the incumbent, and the emoluments consist of salaries and fees on marriages, burials, etc.

Park (pårk), in a legal sense, a large piece of ground enclosed and privileged for wild beasts of chase, by the monarch's grant, or by prescription. The only distinction between a *chace* and a *park* was, that the latter was enclosed, whereas a chace was always open. The term now generally applies to ornamental grounds connected with a gentleman's residence or public grounds devoted to recreation. The latter are generally in or near a large town or city. Within recent years the establishing of city parks has made great progress in the United States, one of the earliest and most famous being the large and picturesque Fairmount Park of Philadelphia. Within the present century the development of pleasure grounds of this kind has gone on very actively in the cities of New York, Chicago, Boston and others of the large cities of this country and in many of the smaller ones. Great national and state parks have also been formed, chief among the former being the Yellowstone and Yosemite national parks. See *National Parks.*

Park City, a town in Knox County, Tennessee; a new place, organized in the first decade of the twentieth century. Pop. 5126.

Park, Mungo, an African traveler, born near Selkirk in Scotland, in 1771; died in 1806. He was educated at Edinburgh for the medical profession; received an appointment as assistant-surgeon on board an East Indiaman and made a voyage to India. Returning to England in 1793 he was engaged by the African Society to trace the course of the Niger. He reached the Gambia at the end of 1795, and advancing northeastward arrived at the Niger near Segu. After exploring part of the course of the river he returned home, and published his *Travels in the Interior of Africa* in 1799. He settled at Peebles as a country doctor, but in 1805 accepted command of a government expedition to the Niger. Having advanced from Pisania on the Gambia to Sansanding on the Niger, he built a boat at the latter place, with the intention of following the Niger to the sea. It was afterwards ascertained that the expedition advanced down the river as far as Boussa, where it was attacked by the natives. It is supposed that Mungo Park was drowned in his efforts to escape. The *Journal* of his second expedition as far as the Niger was published in 1815.

Parke, Thomas Heazle, surgeon, was born in Roscommon, Ireland, in 1857, and educated at Dublin. He participated as surgeon in the campaign in Egypt in 1882 and in that for the relief of General Gordon in 1884-85; also with Stanley's Emin Pasha relief expedition, in 1887-90. He received medals from the British Medical Association, and the Royal Geographical Societies of London and Antwerp, also the Queen's medal, and the Khedive's Star. He died in 1893.

Parker (pår'ker), Alton Brooks, judge, born at Cortland, New York, in 1852. Studied law, practiced at Kingston, and became chief judge of the Court of Appeals of New York in 1898. He took an active part in Democratic politics, was offered the post of Assistant Postmaster-General in 1881, and in 1904 received the Democratic nomination for President of the United States. He was defeated by Theodore Roosevelt, the Republican candidate.

Parker, Gilbert, novelist, born in Canada, in 1862. He lectured in English in Toronto, edited a newspaper in Sydney, and wrote a number of able and popular novels, including *When Valmond came to Pontiak*, *The Seats of the Mighty*, etc.

Parker, John Henry, an English archæologist, born in 1806; died in 1884. He was a well-known publisher in Oxford, and in 1870 became keeper of the Ashmolean Museum. He devoted much time and labor to excavations in Rome.

Parker, Matthew, Archbishop of Canterbury, born at Norwich, in 1504; died in 1575. He was educated at Cambridge, and after having been licensed to preach was appointed dean of Stoke College in Suffolk. He was also made a king's chaplain and a canon of Ely. In 1544 he was appointed master of Corpus Christi College, Cambridge, and elected vice-chancellor of that university the following year. When Queen Mary succeeded to the throne Parker was deprived of his offices, and

remained in concealment until the accession of Elizabeth in 1558. By royal command he was summoned to Lambeth, and appointed Archbishop of Canterbury. It was while he held this office that he had what is known as the *Bishop's Bible* translated from the text of Cranmer, and published at his own expense. He was the founder of the Antiquarian Society, a collector of MSS., which he presented to his college, and editor of the *Chronicles of Walsingham*, *Matthew Paris*, and *Roger of Wendover*.

Parker, THEODORE, an American divine, son of a Massachusetts farmer, born at Lexington in 1810; died at Florence in 1860. He studied at Harvard University, and in 1837 was settled as a Unitarian preacher at West Roxbury. Although his doctrine was accounted heterodox, yet such was his eloquence and ability that he soon became famous as a preacher and lecturer over New England. In 1843 he visited England, France, Italy, and Germany, and settled as a preacher in Boston on his return. He was a prominent advocate of the abolition of slavery. The principal of his published works are: *Occasional Sermons and Specches;* and *Sermons on Theism, Atheism, and the Popular Theology.*

Parker, SIR HYDE, a British admiral, born about the year 1711; fought against the French, Spaniards, and Dutch. In 1783 he perished on his way to the East Indies.

Parker, SIR WILLIAM, a British admiral, born in 1781; died in 1866; entered the naval service, greatly distinguished himself by the capture of the *Belle-Poule*, a French frigate, and in 1809 made himself master of the citadel of Ferrol. In 1841 he took command of the fleet operating against China; forced the entrance of the Yang-tse-kiang, and appeared before Nanking, where terms of peace were agreed upon. In 1863 he was made admiral of the fleet.

Parkersburg (pär'kerz-burg), a city, capital of Wood Co., West Virginia, on the Ohio River, at the mouth of the Little Kanawha, 12 miles from Marietta, Ohio. It has an extensive trade in petroleum, which is abundant in its vicinity, and has large lumber mills, oil refineries, iron and steel, furniture, brick and tile works, etc. Pop. 17,842.

Parkman (park'man), FRANCIS, historian, born at Boston, Massachusetts, in 1823; was graduated at Harvard College in 1844. After spending a year in Europe, he made a trip to the Rocky Mountains and published *The California and Oregon Trail*, and *History of the Conspiracy of Pontiac.* Taking up the history of France in America as his lifework, he wrote a series of able and popular works, admired for their graces of style and graphic delineation of the subject. They include *The Old Régime in Canada* (1864), *The Pioneers of France in the New World* (1865), *The Jesuits in North America* (1866), *The Discovery of the Great West* (1869), *Count Frontenac and New France under Louis XIV* (1878), *Montcalm and Wolfe* (1884), and *A Half Century of Conflict* (1892). He died in 1893.

Parkhurst (park'hurst), CHARLES HENRY, reformer, born at Framingham, Massachusetts, in 1842. He studied theology in Germany and in 1880 became pastor of the Madison Square Presbyterian Church, New York. In 1891, as president of the Society for the Prevention of Crime, he began an attack on the police methods in New York, and was prominent in the investigation that followed.

Parliament (pär'li-ment; French, *parlement*, from *parler*, to speak), the supreme legislative assembly and court of law in Britain. In the article *Britain* the power and organization of Parliament are dealt with, while here its procedure and regulations are noted. When a new Parliament is summoned, and the two houses have met on the appointed day in their respective chambers, the lord-chancellor requires the presence of the Commons in the Upper House to hear His Majesty's commission read. When this is done the Commons withdraw to the Lower House and choose a speaker, previous to the election of whom the clerk of the House acts as speaker. After his election the administration of the requisite oath to the members is then proceeded with in both Houses. When most of the members have been sworn, the Commons are summoned to the Upper House, and the purposes for which Parliament has been assembled are then declared, either by the king in person or by his representative. After the royal speech, containing this declaration, has been read in presence of the members of both Houses, a reply to the address is moved in each house separately.

A house for the transaction of business must consist of at least forty members, otherwise the speaker will not take the chair. The speaker of the House of Commons cannot take part in a debate in the House, and can only speak on

questions of order or practice. He can, however, vote in cases where the votes are equally divided, or in committees of the whole house. The lord-chancellor is *ex officio* the speaker of the House of Lords, and he may both speak and vote in the House. When a division takes place upon a motion (that is, when a vote is taken on the motion) the practice is that those assenting to and those dissenting from the motion before the House each retire into a separate lobby provided for that purpose, and are counted as they re-enter the house, by two tellers on either side, who are appointed by the speaker. The mover of a motion puts it in writing, and delivers it to the speaker, who, when it has been seconded, puts it to the House, after which it cannot be withdrawn without the consent of the House. There are various ways in which a motion may be superseded, such as by the adjournment of the House, by the motion that the orders of the day be now read, and by the moving of the 'previous question' (which see). The House is adjourned when it is found that there are fewer than forty members present. Order is generally enforced by the chair, and in extreme cases of obstruction or the like, the offender is 'named' and suspended, or otherwise dealt with at the discretion of the house. Irrelevancy or tedious repetition may also be dealt with by the chair, and to prevent debates being endlessly protracted, a measure called the 'closure' has been recently adopted. See *Closure*.

The method of making laws is much the same in both Houses. In order to bring a private bill into the House of Commons it is first necessary to prefer a petition setting forth the aims of the measure, and otherwise comply with the standing orders of the house. When this is done the House, on the motion of a member, directs the bill to be introduced. The second reading of the bill is then fixed, and after being read it is referred to a select committee, upon which devolves all the actual work, in the shape of amendment, acceptance, or rejection. The committee on completion of its labors reports to the House, and the bill may then be read a third time and passed. Private bills include all those of a purely local character, such as the measures promoted by municipal corporations, private individuals, railway, gas, and water companies, etc. In public matters a bill is brought in upon motion made to the House without any petition. The bill is read a first time, and after a convenient interval a second time; and after each reading the speaker puts the question whether it shall proceed any further. If the opposition succeeds the bill must be dropped for that session. After the second reading it is referred to a committee, which is either selected by the House or the House resolves itself into a committee of the whole House. A committee of the whole House is composed of every member, and is presided over by a chairman other than the speaker — the speaker having vacated the chair, and the mace that lies before him having been removed. In these committees the bill is debated clause by clause, amendments made, the blanks filled up, and sometimes the bill entirely new-modeled. After it has gone through the committee the chairman reports to the House such amendments as have been made, and then the House reconsiders the whole bill again. When the House has agreed or disagreed to the amendments of the committee, the bill is then ordered to be reprinted. It is then read a third time, and amendments are at this stage of its progress sometimes made. The speaker then puts the question whether the bill shall pass. If this be agreed to the title is settled, and the bill carried to the bar of the Upper House, where it is received by the chancellor. It there passes through the same forms as in the other House, and if rejected no more notice is taken of it. But if it be agreed to the Lords send a message by one of the clerks, or on rare occasions by two masters in chancery to that effect, and the bill remains with the Lords. If any amendments are made, such amendments are sent down with the bill to receive the concurrence of the Commons. If the Commons disagree to the amendments, and both Houses in conference fail to agree, then the bill is dropped. If, however, the Commons agree to the amendments the bill is sent back to the Lords by one of the members, with a message to acquaint them therewith. The same forms are observed, *mutatis mutandis*, when the bill begins in the House of Lords.

The royal assent to bills may be given by the king in person; in which case he attends the House of Lords in state; or the royal assent may also be given under letters patent and notified in his absence, to both Houses assembled together in the Upper House, by commissioners, consisting of certain peers named in the letters. When the bill has received the royal assent in either of these ways it is then, and not before, a statute or act of parliament. All proceedings relating to the public income or expenditure originate in the Commons, a committee of the whole House, called the committee of supply, dis-

cussing and passing the various estimates during the session. These are all consolidated in an appropriation bill at the end of the session sent to the House of Lords for approval, receive the royal assent and become law.

Within recent years, however, a vigorous movement has been made to limit the power of the House of Lords in dealing with financial measures. This movement reached a high state of development in 1910, when it became evident that the hereditary rights of peers to legislative power would have to be curtailed and the constitution of the House of Lords modified, the people sustaining the ministry in a revolt against the existing conditions. As a result a bill was passed by the House of Commons in 1911, and accepted after vigorous opposition by the House of Lords, greatly curtailing the powers of the latter body and making the lower House the dominant power. The right of rejecting or amending money bills was taken from the House of Lords and the scope of what constituted a money bill was extended to include one connected in almost any way with the finances. In addition, if any bill not connected with finance should pass the lower House in three successive sessions of that body it was not to be subject to amendment or rejection by the Lords, provided that two years had passed between its introduction and its third passage. The duration of a Parliament was also limited to five years, instead of seven years, as formerly.

The Parliament of France resembled that of England in being originally a convocation of the great vassals of the crown. St. Louis was the first to introduce into this body counsellors of inferior rank, chiefly ecclesiastics. The parliament had judicial as well as political functions, and after 1304, when it became a permanent court at Paris, the barons rarely attended and lawyers were its chief members and officials. It remained the chief tribunal of the country, except for a short period after 1771, until the Revolution, its most important power being that of registering the edicts of the sovereign and thus giving them the force of law. It could protest against a tyrannous law and was thus able to modify the otherwise absolute power of the monarchs.

Parma (pär'ma), a city of North Italy, capital of the province of Parma, on the small river Parma, 72 miles southeast of Milan. It is surrounded by a line of ramparts and bastions, and though an old town has quite a modern aspect. The principal squares are four, and one of them, the Piazza Grande, is large and handsome. Among the more important buildings are the cathedral, begun in 1058, a cruciform building with a dome, an excellent example of the Lombard-Romanesque style, the interior of the dome being painted in fresco by Correggio; the baptistery, a structure of marble; the Church of La Steccata; the Church of San Giovanni, which, with other churches and buildings, contains paintings by Correggio and Mazzuoli, who were born here; the ducal palace, now the prefecture; the Palazzo dello Pilotta, comprising the museum of antiquities, picture-gallery, and library (more than 300,000 vols. and 5000 MSS.); and the university (about 200 students). Parma was originally an Etruscan town, and became a Roman colony in 183 B.C. The manufactures are of silk, cottons, woolens, felt hats, etc. Pop. 48,523.—The province lies on the right bank of the Po; area, 1253 square miles; pop. 294,159. It is watered chiefly by the Taro, the Parma, and the Enza, all of which fall into the Po.

Parma, DUCHY OF, formerly an independent state of Upper Italy, but since 1860 incorporated in the Kingdom of Italy, and divided into the provinces of Parma and Piacenza. It comprehended the three duchies of Parma proper, Piacentia or Piacenza, and Guastalla, and had an area of about 2266 square miles. Parma anciently formed part of Gallia Cispadana and Liguria. Charlemagne made a present of it to the pope; but it subsequently became an independent republic, and in the sixteenth century was erected into a duchy which was long ruled by the Farnese dukes. The victories of the French in Italy in the beginning of this century enabled Napoleon to seize the duchy and attach it to his Kingdom of Italy. After Napoleon's downfall it fell to his widow, the Archduchess Maria Louisa, for life, and thereafter to the Duke of Lucca.

Parmegianino (pär-mej-à-nē'nō). Same as *Mazzola.*

Parmenides (par-men'i-dēz), a Greek philosopher, native of Elea in Italy, and head of the Eleatic school, flourished about the middle of the fifth century B.C. In 450 he went to Athens, accompanied by his pupil Zeno, and there became acquainted, according to Plato, with Socrates. Like Xenophanes, he developed his philosophy in a didactic poem *On Nature*, of which about 160 lines are still extant. One part of this poem dealt with what *is* or 'Truth.' and the second part with what only *appears* or 'Opinion.'

Parmesan Cheese (pär-me-zan'), a cheese made

in the neighborhood of Parma of skimmed milk by a peculiar process, flavored with saffron, and celebrated for its keeping qualities. Indeed, it becomes so hard as to require to be grated when used.

Parmigiano (pär-mē-jä′nō). See *Mazzola.*

Parnahyba (pär-nȧ-ē′bȧ), a river of Brazil, which rises in the northeast of the province of Goyaz, flows northeast, forms the boundary between the provinces of Piauhi and Maranhão, and falls into the Atlantic below Parnahyba; total course about 800 miles. The port of Parnahyba admits only small vessels. Pop. about 12,000.

Parnassus (pär-nas′sus), or Liakura, a mountain of Greece, situated in Phocis, 65 miles northwest of Athens. It has two prominent peaks, one of which was dedicated to the worship of Bacchus, and the other to Apollo and the Muses, while on its southern slope was situated Delphi and the Castalian fount. Its height is 8068 feet, and a magnificent view is obtained from its top.

Parnell (pär′nel), Charles Stewart, born at his father's estate of Avondale, County Wicklow, Ireland, in 1846, was connected on his father's side with a family that originally belonged to Congleton, Cheshire, and whose members included Parnell the poet, and Sir John Parnell, chancellor of the exchequer in Grattan's Parliament; while his mother was the daughter of Admiral Stewart of the United States navy. He was educated at Magdalen College, Cambridge; became member of parliament for Meath in 1875; organized the 'active' Home Rule party, and developed its obstruction tactics; and in 1879 formally adopted the policy of the newly-formed Land League, was an active member of it, and was chosen president of the organization. In 1880 he was returned for the City of Cork, and was chosen as leader of the Irish party. In the session of 1881 he opposed the Crimes Act and the Land Act; was arrested (October 13th) under the terms of the former, along with other members of his party; and was lodged in Kilmainham Jail, from whence he was not released until the following May. In 1883 he was the recipient of a large money testimonial (chiefly collected in America), and in this year was active in organizing the newly-formed National League. At the general election of 1885 he was re-elected for Cork, and next year he and his followers supported the Home Rule proposals introduced by Mr. Gladstone, while he also brought in a bill for the relief of Irish tenants that was rejected. In 1887 he and other members of his party were accused by the *Times* newspaper of complicity with the crimes and outrages committed by the extreme section of the Irish Nationalist party. To investigate this charge a commission of three judges was appointed by the government in 1888, with the result that, after much evidence had been heard on both sides, a report was laid before Parliament in February, 1890, Mr. Parnell being acquitted of all the graver charges. He died in 1891.

Parnell, Thomas, poet, born in Dublin in 1679; died in 1717. He was educated at Trinity College, and, taking orders in 1705, was presented to the archdeaconry of Clogher, but he resided chiefly in London. He was at first associated with Addison, Congreve, Steele, and other Whigs; but towards the latter part of Queen Anne's reign he joined the Tory wits, of whom the most notable were Swift, Pope, Gay, and Arbuthnot. He afforded Pope some assistance in his translation of Homer, and wrote the *Life* prefixed to it. By Swift's recommendation he obtained a prebend in the Dublin Cathedral and the valuable living of Finglass. After his death a collection of his poems was published by Pope in 1721.

Parochial Board (pa-rō′ki-al), in Scotland, a body of men in a parish elected by the payers of poor-rates to manage the relief of the poor, a duty which, in England, is performed by overseers, and in some cases by the guardians of the poor.

Parody (par′u-di), a kind of literary composition, usually in verse, in which the form and expression of grave or serious writings are closely imitated, but adapted to a ridiculous subject or a humorous method of treatment.

Parole (pa-rōl′), a promise given by a prisoner of war that he will not try to escape if allowed to go about at liberty; or to return, if released, to custody at a certain time if not discharged; or not to bear arms against his captors for a certain period; and the like.

Paros (pā′ros), an island in the Grecian Archipelago, one of the Cyclades, 4 miles west of Naxos; length 13 miles; breadth 10 miles. It is generally mountainous; but the soil, though often rocky, is fertile, and in some places well cultivated. Its marble has been famous from ancient times, and is the material of which some of the most celebrated pieces of statuary are composed. Paros was the birthplace of the poet Archilochus and the painter Polygnotus. Parikia, a seaport on the northwest coast, is the chief town; pop. 2200. Pop. of island, 7740.

Parotid Gland (pa-rot'id), in anatomy, one of the salivary glands, there being two parotids, one on either side of the face, immediately in front of the external ear, and communicating with the mouth by a duct.

Parquetry (pår'ket-ri), a species of inlaid woodwork in geometric or other patterns, and generally of different colors, principally used for floors.

Parr (pår), a small fish common in the rivers of England and Scotland, at one time believed to be a distinct species of the genus *Salmo*, but now almost universally regarded as the young of the salmon. The term is also applied to the young of any of the Salmonidæ. Called also *Brandling*.

Parr, Catharine. See *Catharine Parr*.

Parr, Samuel, an English scholar, born in 1747; died in 1825. He was educated at Harrow and Cambridge; taught successively in the grammar schools of Stanhope, Colchester, and Norwich; and in 1783 became perpetual curate of Hatton in Warwickshire. Here he engaged in literature, and became noted among his contemporaries as a classical purist and bitter polemic.

Parr, Thomas, better known as *Old Parr*, was born, it is said, in 1483 at Winnington, Shropshire, and died in 1635, he being then in his 152d year. A metrical account of his career was published in 1635 by John Taylor, the 'water poet,' and he was buried in Westminster Abbey, where a monument records his longevity. His age, however, has been disputed, and doubtless he was not nearly so old as represented.

Parrakeet, or Paroquet. See *Parakeet*.

Parrhasius (par-rā'she-us), a Greek painter, born at Ephesus, flourished about 420 B.C. Several of his pictures are mentioned by ancient authors, but none of them have been preserved.

Parrot (par'ut), a name common to birds of the family Psittacidæ, of the order Scansores or climbers. The bill is hooked and rounded on all sides, and is much used in climbing. The tarsi are generally short and strong, the toes being arranged two forwards and two backwards. The tongue, unlike that of most other birds, is soft and fleshy throughout its whole extent. The wings are of moderate size, but the tail is often elongated, and in some cases assists in climbing. The plumage is generally brilliant. Parrots breed in hollow trees, and subsist on fruits and seeds. Several species can not only imitate the various tones of the human voice, but also exercise in some cases actual conversational powers. Some live to a great age, instances being known of these birds reaching seventy and even ninety years. The species are numerous, and are known under the various names of parrots, parakeets, macaws, lorikeets, lories, and cockatoos (see these articles), the name parrot, when used distinctively, being generally applied to species of some size, that have a strongly hooked upper mandible and a short or medium-length tail. They are natives of both tropical and subtropical regions, and even extend northwards into the United States, and south to the Straits

Psittacidæ.

1, Head and foot of Macaw (*Macrocercus arasanga*. 2, Do. of Blue-bellied Lorikeet (*Trichoglossus Swainsonii*). 3, Do. of Goliath Aratoo (*Microglossus aterrimus*). 4, Head of Gray Parrot (*Psittăcus erythăcus*).

of Magellan, New Zealand, and Tasmania. The best-known species is the Gray Parrot (*Psittăcus erythăcus*) of Western Africa, which can be most easily trained to talk. The Green Parrots (*Chrysōtis*) are also common as domestic pets, being brought from the tropical regions of South America. The Carolina parrot (*Conūrus Carolinensis*) is found in the United States, and is gregarious in its habits.

Parrot-coal, a name given in Scotland to cannel-coal. Miners distinguish this coal into two varieties — viz. 'dry' or gas parrot, and 'soft' or oil parrot.

Parrot-fish, a fish of the genus *Scarus*, family Labridæ, remarkable for the beak-like plates into which the teeth of either jaw are united, and for their brilliancy of color, from one

or other of which circumstances they have received their popular name. Most of the species are tropical, but one, *S. cretensis*, the *searus* of the ancients, and esteemed by them the most delicate of all fishes, is found in the Mediterranean.

Parry (par'ri), Sir William Edward, born at Bath in 1790; died in 1855. He joined the navy in 1803, became lieutenant in 1810, took part in the successful expedition up the Connecticut River in 1813, and continued on the North American station till 1817. In the following year he was appointed commander of the *Alexander* in an expedition to the Arctic regions under Sir John Ross, and during the succeeding nine years he commanded various expeditions on his own account in efforts to find a northwest passage, and to reach the north pole. He afterwards filled various government situations, became rear-admiral of the white, lieutenant-governor of Greenwich Hospital, and received the honor of knighthood. He published several volumes, in which he narrated his voyages and adventures..

Parsees (pär-sēz'), the name given in India to the fire-worshiping followers of Zoroaster, chiefly settled in Bombay, Surat, etc., where they are amongst the most successful merchants. They have a great reverence for fire in all its forms, since they find in it the symbol of the good deity Ahurâ-Mazda (Ormuzd). To this divinity they have dedicated 'fire-temples,' on whose altar the sacred flame is kept continually burning. Benevolence is the chief practical precept of their religion, and their practice of this finds its evidence in their many charitable institutions. One of the most curious of their customs is in the disposal of their dead. For this they erect what are called 'towers of silence,' built of stone, about 25 feet high, and with a small door to admit the corpse. Inside is a large pit with a raised circular platform round it on which the body is exposed that it may be denuded of flesh by vultures, after which the bones drop through an iron grating into the pit below. The number of Parsees in India is about 100,000. See *Guebres*.

Parsley (pärs'li), a plant of the nat. order Umbelliferæ, one species of which, the common parsley (*Petroselīnum satīvum*), is a well-known garden vegetable, used for communicating an aromatic and agreeable flavor to soups and other dishes. It is a native of Sardinia, introduced into Britain about the middle of the sixteenth century, and now widely grown. A variety with curled leaflets is generally preferred to that with plain leaflets, as being finer flavored. Hamburg parsley, a variety with a large white root like a carrot, is cultivated for its roots, and much in the same way as carrots or parsnips.

Parsnip (pärs'nip), a plant of the genus *Pastinăea*, nat. order Umbelliferæ, the *P. satīva* (common or garden parsnip), of which there are many varieties. It is a tall, erect plant, with pinnate leaves and bright-yellow flowers, common throughout England and in most parts of Europe and America, and much cultivated for its roots, which have been used as an esculent from a very early period. They are also cultivated as food for the use of cattle.

Parson (pär'sun), in English ecclesiastical law, is the rector or incumbent of a parish; also, in a wider sense, any one that has a parochial charge or cure of souls. Four requisites are necessary to constitute a parson, viz.: holy orders, presentation, institution, and induction. His duties consist chiefly of performing divine service and administering the sacraments. In the United States parson is synonymous, in common speech, with minister, preacher, or clergyman.

Parsons, a city of Labette Co., Kansas, on the Missouri River, 48 miles s. s. w. of Fort Scott. Coal is mined in the vicinity, and it has carshops and manufactures of poultry-food, flour, and lumber. Pop. 12,463.

Parsonstown (pärs'nz-toun), formerly called Birr, a market-town in King's county, Ireland, on the river Little Brosna, about 90 miles s. w. of Dublin. The modern parts are well built and regularly laid out in streets and squares. Birr Castle, the seat of the Earl of Rosse, with its famous telescope, closely adjoins the town. Pop. 4438.

Parterre (pär-tār'), a system of garden flower-beds arranged in a design, with turf or gravel spaces intervening. Also applied to the pit of a French theater.

Parthenogenesis (pär-the-nō'jen-e-sis; Greek, *parthenos*, a virgin: *genesis*, birth), in zoölogy, a term applied to the production of new individuals from virgin females by means of ova, which are enabled to develop themselves without the contact of the male element. We find several examples of this peculiar phenomenon among insects. The most notable are the aphides or plant-lice, whose fertilized ova, deposited in the autumn, lie without apparent development throughout the winter, and in the following spring produce modified females only. These females, without sexual contact with the males,

give birth to a second generation like to themselves, and this form of reproduction is indefinitely repeated. In the succeeding autumn, however, male insects appear in the brood, and the ova are again impregnated with the male element. In this case parthenogenesis has more the appearance of alternate generation. Perhaps the truest instance of parthenogenesis is found in the unfertilized queen-bee, which deposits eggs out of which male or drone-bees are hatched. The eggs which produce neuters or females are impregnated in the usual way, but the eggs which produce the males are not fertilized. In the silkworm moth certain females, without fertilization, produce eggs from which ordinary larvæ are duly developed.

Parthenon (pär'the-non; Gr., from *parthenos*, a virgin — *i.e.*, Athena or Minerva), a celebrated Grecian temple of Athena, on the Acropolis of Athens, one of the finest monuments of ancient architecture. It is built of marble, in the Doric style, and had originally 8 columns on each of the two fronts, with 17 columns on the sides, or 46 in all, of which 32 are still standing; length 228 feet, breadth 101, and height to the apex of the pediments 64 feet; height of columns 34 feet 3 inches. The pediments were filled with large statues, the metopes adorned with sculptures in relief. After serving as a Christian church and as a mosque, it was rendered useless for any such purpose in 1687 by the explosion of a quantity of gunpowder which the Turks had placed in it during the siege of Athens by the Venetians. Though the more precious pieces of sculpture have been dispersed among various European collections (see *Elgin Marbles*), the Parthenon still bears an imposing aspect.

Parthia (pär'thi-a), in the widest sense, was the Parthian Empire, lying between the Euphrates, the Oxus, the Caspian Sea, and the Arabian Sea. In the narrowest sense Parthia was the small country originally inhabited by the Parthians, and situated in the northwestern part of the modern Persian province of Khorasan. The Parthians were of Scythian origin, fought only on horseback, and were celebrated for their skill in archery. They were subject successively to Persians, Macedonians and Syrians, and finally developed an important empire extending to the Euphrates, and resisting the Romans with various fortune. The Parthian dynasty, founded by Arsaces (256 B.C.), was succeeded by the Sassanidæ, the latter being founded by Artaxerxes (214 A.D.), a Persian, who conquered all Central Asia. These again were followed by the conquering Mohammedans. See *Persia*.

Participle (pär'ti-si-pl; Latin, *participium*), in grammar a part of speech, so called because it partakes of the character both of a verb and an adjective. The participle differs from the adjective in that it implies time, and therefore applies to a specific act, whereas the adjective designates only an attribute, as a habitual quality or characteristic, without regard to time. When we say, 'he has *learned* his lesson,' we have regard to a specific act done at a certain time; but in the phrase 'a *learned* man,' *learned* designates a habitual quality. In the former case *learned* is a participle; in the latter, an adjective. There are two participles in English: the present — ending in *-ing*, and the past — ending, in regular verbs, in *-ed*.

Partick (pär'tik), a police burgh of Scotland, county of Lanark, on the Kelvin and the Clyde, adjoining Glasgow on the west. It has flour-mills, engineering works, shipbuilding yards, etc. Pop. 54,298.

Particles (pär'ti-klz), such parts of speech as are incapable of any inflection, as, for instance, the preposition, conjunction, etc.

Partnership (pärt'nėr-ship) is the association of two or more persons for the purpose of undertaking and prosecuting conjointly any business, occupation, or calling; or a voluntary contract by words or writing, between two or more persons, for joining together their money, goods, labor, skill, or all or any of them, upon an agreement that the gain or loss shall be divided in certain proportions amongst them, depending upon the amount of money, capital, stock, etc., furnished by each partner. Partnership may be constituted by certain acts connected with the undertaking apart from any deed or oral contract. The duration of the partnership may be limited by the contract or agreement, or it may be left indefinite, subject to be dissolved by mutual consent. The members of a partnership are called *nominal* when they have not any actual interest in the trade or business, or its profits, but, by allowing their names to be used, hold themselves out to the world as apparently having an interest; *dormant* or *sleeping*, when they are merely passive in the firm, in contradistinction to those who are active and conduct the business as principals, and who are known as *ostensible* partners. A partnership may be limited to a particular transaction or branch of business, without comprehend-

ing all the adventures in which any one partner may embark, but such reservation must be specified in the deed of contract. For in the usual course each member of a partnership is liable at common law for the debts of the firm, and a sleeping partner is responsible for all debts of the firm which have been contracted during his partnership. The powers of partners are very extensive, and the contract or other act of any member or members of the associated body in matters relating to the joint concern is, in point of law, the contract or act of the whole, and consequently binding upon the whole, to the extent of rendering each liable for it individually as well as in respect of the partnership property. This power does not extend to matters extraneous to the joint concern. Partners, though they should act in a fraudulent manner as respects their copartners, bind the firm in all matters connected with its peculiar dealings.

Parton (par'tun), JAMES, biographer, born at Canterbury, England, in 1822; died in 1891. He became a resident of New York and for a time was editor of the *Home Journal*. He wrote numerous able and popular works of biography. Among them were *Life of Thomas Jefferson*, *Life and Times of Benjamin Franklin*, *Life of Voltaire*, *Captains of Industry*, *Famous Americans*, etc.

Partridge (pår'trij), a well-known rasorial bird of the grouse family (Tetraonidæ). The common partridge (*Perdix cinereus*) is the most plentiful of all game-birds in Britain, and occurs in nearly all parts of Europe, in

Red-legged Partridge (*Perdix rufus*).

North Africa, and in some parts of Western Asia. The wings and tail are short, the tarsi as well as the toes naked, and the tarsi not spurred. The greater part of the plumage is ash-gray finely varied with brown and black. They feed on grain and other seeds, insects and their larvæ and pupæ, and are chiefly found in cultivated grounds. Besides this species there are the red-legged, French, or Guernsey partridge (*P.* or *Caccabis rufus*), which may now be found in considerable numbers in different parts of England; the Greek partridge (*P. saxatilis*), the African partridge, the Arabian partridge, the Indian partridge. The name partridge is applied in the United States to several North American species of the genus *Ortyx* or quails.

Partridge Berry, a plant of the heath family, the *Gaultheria procumbens*, inhabiting North America, also known as wintergreen. The name is also applied to another North American shrub, *Mitchella repens*, a pretty little trailing plant, with white fragrant flowers and scarlet berries, nat. order Rubiaceæ.

Partridge Pigeon, a name for some of the Australian pigeons, otherwise called bronze-wings (which see).

Partridge Wood, a very pretty hardwood obtained from the West Indies and Brazil, and much esteemed for cabinet-work. It is generally of a reddish color, in various shades from light to dark, the shades being mingled in thin streaks. It is said to be yielded by a leguminous tree, *Andira inermis*, and other South American and West Indian trees.

Parts of Speech are the classes into which words are divided in virtue of the special functions which they discharge in the sentence. Properly speaking, there are only seven such classes, namely the noun, adjective, pronoun, verb, adverb, preposition and conjunction; for the article, which is usually classed as a separate part of speech, is essentially an adjective, while the interjection can hardly be said to belong to articulate speech at all. Each of the parts of speech will be found separately treated under their several heads throughout the work.

Party-wall is the wall that separates two houses from one another. Such a wall, together with the land upon which it stands, belongs equally to the landlords of the two tenements, half belonging to the one and half to the other.

Parvis (pår'vis), PARVISE, the name given in the middle ages to the vacant space before a church, now applied to the area round it.

Pasadena (pas-a-dē'na), a city and winter resort of Los Angeles Co., California, 10 miles N. E. of Los Angeles, on the Southern Pacific, the Southern California, and other railroads. It is near the base of the Sierra Madre

Mountains, and embowered in a wealth of southern vegetation. The city has important fruit industries, particularly oranges and lemons. It has a polytechnic school and a natural history museum. Pop. 30,291.

Pascal (pas'kal), BLAISE, a French philosopher and mathematician, born at Clermont, in Auvergne in 1623; died in 1662. In early youth he showed a decided inclination for geometry, and so rapid was his advance that while yet in his sixteenth year he wrote a treatise on conic sections, which received the astonished commendation of Descartes. His studies in languages, logic, physics, and philosophy were pursued with such assiduity that his health was irrecoverably gone in his eighteenth year. In 1647 he invented a calculating machine, and about the same time he made several discoveries concerning the equilibrium of fluids, the weight of the atmosphere, etc. He now came under the influence of the Jansenists — Arnauld and others — and from 1654 he lived much at the monastery of Port Royal, and partly accepted its rigorous rule, though he never actually became a solitaire. He afterwards retired to a country estate, and finally returned to Paris, where he closed a life of almost unbroken ill-health. About 1655 he wrote, in defense of his Jansenist friend Arnauld, his famous 'Provincial Letters' (*Lettres Écrites par Louis de Montalte à un Provincial de ses Amis*), and after his death his *Pensées* or *Thoughts* were published as the fragments of an unfinished apology for Christianity. The latter, however, for long appeared in a garbled and corrupt form, and it is only lately that anything like a pure text has appeared. Of the *Lettres* there are many trustworthy editions.

Pasco. See *Cerro de Pasco.*

Pas-de-Calais (pä-dė-kå-lā), a maritime department of Northern France; area, 2606 square miles. Its coast, extending about 80 miles, presents a long tract of low sandhills, but near Boulogne forms a lofty crumbling cliff. The interior is generally flat, the streams and canals are numerous, and the soil fertile and well cultivated. The principal harbors are Boulogne and Calais. The chief minerals are indifferent coal, good pipe and potter's clay, and excellent sandstone. There are numerous iron-foundries, glassworks, potteries, tanneries, bleachworks, mills, and factories of all kinds. The capital is Arras. Pop. 1,012,466.

Pasewalk (pä'zė-vålk), a town of Prussia, government of Stettin, 27 miles from the town of that name, situated on the Ucker. Its industries embrace iron-founding, starch, tobacco, etc. Pop. 10,519.

Pasha (pa-shạ', på'shå), in Turkey, an honorary title originally bestowed on princes of the blood, but now conferred upon military commanders of high rank and the governors of provinces. There are three grades, each distinguished by a number of horse-tails waving from a lance, the distinctive badge of a pasha. Three horse-tails are allotted to the highest dignitaries; the pashas of two tails are generally the governors of the more important provinces; and the lowest rank, of one tail, is filled by minor provincial governors. Spelled also *Pacha* (the French spelling).

Pasht, in Egyptian mythology, a goddess chiefly worshiped in Bubastus, in Lower Egypt, whence her alternative name of *Bubastes*. She was said to be the daughter of the great goddess Isis. She was represented with the head of a cat, the animal sacred to her.

Pasque Flower (pask), the name given to *Anemōne Pulsatilla*, nat. order Ranunculaceæ, a plant with purplish flowers found on the continent of Europe, and so named because its petals are frequently used to dye Easter or *pasque eggs*. The flower blossoms in spring, and its leaves when crushed emit an acrid, poisonous juice.

Pasquil. See *Pasquinade.*

Pasquinade (pas'kwi-nād), a lampoon or short satirical publication, deriving its name from *Pasquino*, a tailor (others say a cobbler, and others again a barber) who lived about the end of the 15th century in Rome, and who was much noted for his caustic wit and satire. Soon after his death satirical placards were attached to a mutilated statue which had been dug up opposite his shop. His name was transferred to the statue and the term *pasquil* or *pasquinade* applied to the placards in which the wags of Rome lampooned well-known personages.

Passaic (pas-sa'ik), a city of Passaic county, New Jersey, on the Passaic River, and the Erie, the Lackawanna, and other railroads, 5 miles S. S. E. of Paterson. It is a busy manufacturing city, with extensive print and chemical works, also manufactures of woolens, blankets, rubber, silk, soap, matches, etc. Pop. 54,773.

Passamaquoddy Bay (pas-så-må-kwod'di), a bay opening out of the Bay of Fundy, and lying between the state of Maine

and the Canadian province of New Brunswick. It is about 13 miles long and 6 miles wide, and is dotted with islands which make a safe harbor for the thriving town of Eastport.

Passant (pas'ant), in heraldry, a term applied to a lion or other animal in a shield appearing to walk leisurely, looking straight before him, so that he is seen in profile; when the full face is shown the term *passant gardant* is employed; and when the head is turned fairly around, as if the animal were looking behind, it is *passant regardant.*

Passau (pâs'sou), a town of Bavaria, picturesquely situated on a rocky tongue of land formed by the confluence of the Inn and Danube, 91 miles E. N. E. of Munich, on the southeast frontier of the kingdom. The principal buildings are the cathedral, an important example of 17th century work; the bishop's palace; Church of St. Michael; Jesuit College, now a lyceum; the town-house, gymnasium, library, etc. There is an important trade in timber. The fortress of Oberhaus crowns a precipitous wooded height (426 feet) on the left bank of the Danube opposite Passau. Pop. 18,003.

Passengers (pas'en-jėrz). Railway, and other public carriers are legally required to carry passengers without any negligence on their (the carriers') part. In case of accident the carrier is obliged to show that it was from no fault or negligence on his part, or on the part of his servants, that the accident occurred. Hence all passengers injured (or in case of death their nearest relatives) have a claim for compensation, unless it can be proved that the accident was due to the fault of the passenger. Passengers by sea are carried subject to the same general law as those by land; the carriers are bound to observe all due precautions to prevent accident or delay. No passenger ship having fifty persons on board, and the computed voyage exceeding eighty days by sailing vessels or forty-five by steamers, can proceed on its voyage without a duly qualified medical practitioner on board. In the case of imminent danger from tempest or enemies passengers may be called upon by the master or commander of the ship to lend their assistance for the general safety.

Passeres (pas'e-rēz), the name given by Linnæus and Cuvier to the extensive order of birds also called Insessores or perchers. See *Insessores, Ornithology.*

Passing-bell, the bell that was rung in former times at the hour of a person's death, from the belief that devils lay in wait to afflict the soul the moment when it escaped from the body, and that bells had the power to terrify evil spirits. In the proper sense of the term it has now ceased to be heard, but the tolling of bells at deaths or funerals is still a usage, more particularly as a mark of respect.

Passion (pash'un), THE, a name for the crucifixion of Jesus and its attendant sufferings.

Passion-flower (*Passiflōra*), a large genus of twining plants belonging to the nat. order Passifloraceæ. They are all twining plants, often climbing over trees to a considerable length, and in many cases are most beautiful objects, on account of their large, rich, or gaily-colored flowers, which are often succeeded by orange-colored edible fruits, for which indeed they are chiefly valued in the countries where they grow wild. *Passiflora laurifolia* produces the water-lemon of the West Indies, and *P. maliformis* bears the sweet calabash. The name is applied more especially to *P. cærulĕa,* which is commonly cultivated in England out of doors, and is the one to which the genus owes its name.

Passionists (pash'un-istz), a religious order in the Church of Rome, founded in 1737. The members practice many austerities; they go barefooted, rise at midnight to recite the canonical hours, etc. It is also known as the Order of the Holy Cross and the Passion of Christ.

Passion Play, a mystery or miracle play representing the different scenes in the passion of Christ. The passion play is still extant in the periodic representations at Oberammergau (which see).

Passion Week. See *Holy Week.*

Passive (pas'iv), in grammar, a term applied to certain verbal forms or inflections expressive of suffering or being affected by some action, or expressing that the nominative is the object of some action or feeling; as, she *is loved* and *admired.*

Passometer (pas-om'e-tėr), a small machine, with a dial and index-hands like a watch, carried by pedestrians to record their steps in walking; a sort of hodometer. Also known as Pedometer.

Passover (pas'ō-ver), a feast of the Jews, instituted to commemorate the providential escape of the Hebrews in Egypt, when God, smiting the first-born of the Egyptians, *passed over* the houses of the Israelites, which

were marked with the blood of the paschal lamb. It was celebrated on the first full moon of the spring, from the 14th to the 21st of the month Nisan, which was the first month of the sacred year. During the eight days of the feast the Israelites were permitted to eat only unleavened bread, hence the passover was also called the 'feast of unleavened bread.' Every householder with his family ate on the first evening a lamb killed by the priest, which was served up without breaking the bones. The passover was the principal Jewish festival.

Passport (pas'pōrt), a warrant of protection and authority to travel, granted to persons moving from place to place, by a competent authority. In some states no foreigner is allowed to travel without a passport from his government, and in all cases the visitor to the continent of Europe is wiser to provide himself with one, if only as a means of identification. In Russia and Turkey, in particular, a passport is indispensable. Passports to British subjects are granted at the Foreign Office, London. In the United States passports, with description of the applicant, are issued by the State Department at Washington. They are good for two years from date, renewable by stating the date and number of the old one. The fee required is one dollar. They are issued only to citizens, native-born or naturalized.

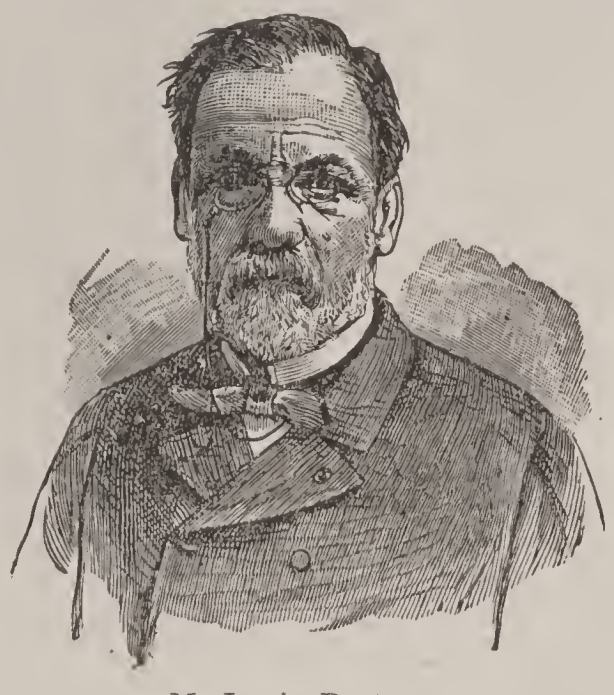
Pasta (pàs'tà), GIUDITTA, an operatic singer, born at Como, near Milan, in 1798, of Jewish parents; died in 1865. She appeared at first without success, but in 1819–22 her reputation steadily increased, and up till 1833 she held one of the foremost places on the lyric stage, which she then quitted. She was specially distinguished in the tragic opera: Bellini wrote for her his *Norma* and *Sonnambula*, and she made the rôles of *Medea*, *Desdemona*, and *Semiramide* her own.

Paste (pāst), a composition in which there is just sufficient moisture to soften without liquefying the mass, as the paste made of flour used in cookery. The term is applied to a highly refractive variety of glass, a composition of pounded rock-crystal melted with alkaline salts, and colored with metallic oxides: used for making imitation gems. One variety of it is called *Strass*.

Pastel (pas'tel), or PASTIL, a colored crayon. *Pastel painting*. See *Crayon*.

Pastern (pas'tėrn), the part of a horse's leg between the joint next the foot and the coronet of the hoof: it answers to the first phalanx of a man's finger.

Pasteur (pàs-t*eur*), LOUIS, a French chemist and physicist, born at Dôle, Jura, in 1822; educated at Jena University and the École Normale, Paris, where in 1847 he took his degree as doctor. The following year he was appointed professor of physics in Strasburg, where he devoted much research to the subject of fermentation; in 1857 he received the appointment of dean in the Faculty of Sciences, Lille; in 1863 he became professor of geology, chemistry, and physics



M. Louis Pasteur.

at the École des Beaux-Arts, Paris; and in 1867 professor of chemistry at the Sorbonne. He became a member of the French Academy in 1882. He won a world-wide reputation by his success in demonstrating the agency of microbes in fermentation and decomposition, in introducing a successful treatment of disease in silkworms and cattle, and in his efforts to check hydrophobia by means of inoculation. To enable him to deal with this disease under the best conditions a *Pasteur Institute* was opened in Paris, where patients were received from all parts of Europe. Similar institutions have been opened elsewhere. He died in 1895. See *Hydrophobia*.

Pasticcio (pàs-tish'i-ō), in music, an opera, cantata, or other work, the separate numbers of which are gleaned from the compositions of various authors, or from several disconnected works of one author. In art the term is applied to a work which, though original in subject, is in treatment and execution in the direct manner of another artist.

Pastille (pas′til, pas-tēl′), or PASTIL, a mixture of odorous gum-resin made up into small cones and burned in an apartment to give it a pleasant perfume. Pastilles are also made into pills, and used by smokers to give the breath an aromatic odor.

Pasto (päs′tō), a town of the republic of Colombia, dep. Cauca, founded in 1539. It has manufactures of blankets, hats, pottery, etc. Pop. 6000.

Paston Letters, THE, a collection of letters written by and to members of the Paston family in Norfolk during the period of the wars of the Roses, four volumes of which were published by Mr. (afterwards Sir) John Fenn, and a fifth by his literary executor, Sergeant Frere (London, 1787–89 and 1823). These letters deal freely with the domestic affairs, the interests in public movements, the intriguing at elections, and the lawsuits of this particular family, and all the relations of English popular life in the period in which they were written. An accurate and extended edition in 3 vols. by Mr. Gairdner has been published (1872–75).

Pastor (pas′tur), a genus of birds belonging to the starling family, found in the north of Africa, Syria, and India. The rose-colored pastor (*P. rosĕus*) is a favorite song bird.

Pastor, the regularly ordained preacher of a congregation of religious worshipers.

Pastoral Letters (pas′tur-al) are circulars addressed by a bishop to the clergy or laity under his jurisdiction at certain stated times or on special occasions for purposes of instruction or admonition.

Pastoral Poetry, poetry which deals, in a more or less direct form, with rustic life. It has generally flourished in highly-corrupted artificial states of society. Thus it was that Theocritus, the first pastoral poet, made artistic protest against the licentiousness of Syracuse; and Virgil wrote his *Bucolics* and *Eclogues* in the corrupt Roman court. In the 16th century pastoral poetry received its most notable expression in the *Arcadia* of G. Sannazaro, the *Aminta* of Tasso, and the *Pastor Fido* of Guarini. This tendency, which was so potent in Italy, spread to England, and influenced the *Shepherd's Calendar* of Spenser, the *Arcadia* of Sidney, the *Faithful Shepherdess* of Fletcher, *As You Like It* of Shakespeare, and the *Comus* of Milton. The *Gentle Shepherd* of Allan Ramsay (1725) was the last successful dramatic pastoral.

Pastoral Ring, a ring worn by bishops on the ring-finger of the right hand.

Pastoral Staff, the official staff of a bishop or abbot. It is of metal, or of wood ornamented with metal, and has the head curved in the form of a shepherd's crook as a symbol of the pastoral office. See *Crosier*.

Pastoral Theology, that part of theology which treats of the obligations of the pastors themselves, and which is therefore designed for the training and preparation of the candidates for the pastoral office.

Pastry (pās′tri), articles of food made of paste or dough, which has been worked up with butter or fat, so that it assumes a light, flaky appearance. There are several varieties, such as puff-paste, paste for raised pies, and a light spongy kind called *brioche*. Pastry as a rule is somewhat indigestible.

Pasture (pas′tūr), land under grass and herbage, which is eaten as it grows by horses, oxen, sheep, and other herbivorous animals. First-class pastures are used for feeding heavy oxen; second class for inferior or dairy cattle; while hillsides, moors, and uplands are utilized for sheep. The great plains of the Western United States have long been devoted to pasture, feeding vast multitudes of grazing animals, and the same is the case with the great grassy areas of South America, New Zealand, and Australia. See *Common*.

Patagium (pa-ta-jī′um) is the name applied to the expansion of the skin or integumentary membrane by means of which bats, flying squirrels, flying lizards, and other semi-aerial forms support themselves in the air. This membrane is not a true wing, but is used as a kind of parachute for temporary support.

Patagonia (pa-ta-gō′ni-a), the name usually applied to that southern portion of South America which is bounded E. by the Atlantic, W. by the Pacific, S. by the Straits of Magellan, and N. by the Rio Negro. Since 1881 this large territory has been, by treaty, divided between Chile and the Argentine Republic, so that the portion west of the Andes (63,000 square miles) belongs now to the former, and the portion east of the Andes (360,000) belongs to the latter. The Straits of Magellan form a southern boundary of 360 miles, and separate the mainland from the numerous islands of Tierra del Fuego. Here the Chilean government has established the settlement of Punta Arenas, with stations along the

coast. Patagonia east of the Andes consists mainly of vast undulating plains, frequently covered with shingle and broken up by ridges of volcanic rock. The vegetation is scanty, except in the region adjoining the Andes, and in many places there are shallow salt lakes and lagoons. The chief rivers are the Rio Negro, the Chupat, the Rio Desire, and the Rio Chico, all of which have their sources in the Andes, and run eastward. There are few if any good seaports. The Patagonians are a tall, muscular race averaging fully 6 feet in height, with black hair, thick lips, and skin of a dark-brown color. They are a nomad race, divided into numerous tribes, whose chief occupation is in hunting and cattle-breeding. This native population, however, never numerous, is rapidly disappearing. Colonization is encouraged by the Argentine government, and there are many tracts suitable for European settlement. The country was first discovered by Magellan in 1520.

Patamar (pa-ta-mär′), a vessel employed in the coasting trade of Bombay and Ceylon. Its keel has an upward curve amidships, and extends only about half the length of the vessel; the stem and stern, especially the former, have great rake; and the draught of water is much greater at the head than at the stern. These vessels sail remarkably well, and stow a good cargo.

Patan. See *Lalitapatan.*

Patchouli (pa-chö′li), a perfume obtained from the dried leaves and branches of the *Pogostēmon patchouli*, a labiate plant of India and China, where it is cultivated on a large scale. It is used in India to scent costly Cashmere shawls, tobacco, and hair-oil, and is everywhere valued as a preservative of woolens and linens from insects.

Pâté de foie gras (pä-tā dė fwå grä), a dish made from the enlarged livers of overfed geese, and much relished by epicures. It is made in the form of a pie, and from its oily nature is very indigestible.

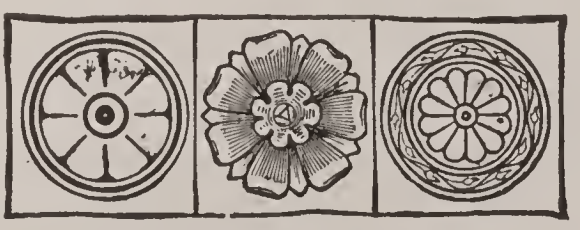
Patella (pa-tel′a), the name applied in anatomy to the 'knee-cap' or 'knee-pan,' the sesamoid bone of the knee.— The name is also applied to a genus of gasteropodous molluscs comprising the limpets.

Paten (pat′en), an ecclesiastical term applied to the round metallic plate on which the bread is placed in the sacrament of the Lord's supper. It often serves as a cover for the chalice.

Patent (pat′ent, pā′tent), a privilege from government granted by letters patent (whence the name), conveying to the individual or individuals specified therein the sole right to make, use, or dispose of some new invention or discovery for a certain limited period. The patent laws vary considerably in different countries. In the United States under the act of 1870 a patent is granted for a period of seventeen years to the original inventor only; in France it is granted to the patentee for a term of fifteen years on payment of $20 annually; in Germany the period is fifteen years with a first payment of $7.50; in Great Britain it is granted for fourteen years, but the period may be extended if the inventor can prove that his invention, while useful, has been of little benefit to him. The various colonies and dependencies of Great Britain have each a separate patent law. An international convention for the protection of patentees has been formed whereby equal rights are secured in all the signatory countries. The Patent Office of the United States is a bureau of vast extent, its extensive museum of 300,000 models, located in a fine marble building, being one of the sights of the capital. It employs a large number of examiners and clerks, and issues more than 30,000 patents annually. It issues monthly volumes in quarto, with detailed descriptions and drawings of patents, and a weekly *Official Gazette* of the Patent Office, with reduced drawings and lists of new patents.

Within forty years (1871–1910) the United States issued over 800,000 patents, while the total number, since the formation of the government, crossed the 1,000,000 mark in 1911. This much surpasses the issue of other countries, the patents issued by Great Britain and France being about 400,000 for each country; Germany, 225,000; Belgium, 200,000; Canada, 120,000, and other nations in diminishing numbers.

Patera (pat′e-ra), a shallow, circular, saucer-like vessel used by the Greeks and Romans in their sacrifices and libations. The name is applied in architecture to the representation of a flat round dish in bas-relief, used as an ornament in friezes, etc.



Architectural Pateræ.

Paterculus (pa-tėr'ku-lus), CAIUS VELLEIUS, an ancient Roman historian, born about 19 B.C.; died about 31 A.D.

Paternians (pa-tėr'ni-anz), a heretical sect of the 5th century, followers of *Paternus*, who are said to have held that God made the nobler parts of man and Satan the lower. Hence they served God with the former parts and the devil with the latter.

Paterno (pȧ-tėr'nō), an ancient town of Sicily, 10 miles northwest of Catania, at the foot of Mt. Etna. In the vicinity are mineral springs and the remains of baths, an aqueduct, etc. Pop. 20,098.

Paternoster (pā'tėr-nos-tėr; Latin, 'Our Father'), the opening of words of the Latin version of the Lord's prayer, hence employed to designate the prayer itself. See *Lord's Prayer.*

Paterson (pat'er-sun), a city, the capital of Passaic county, New Jersey, on both sides of the Passaic, near its celebrated falls, and 16 miles northwest from New York. The town was founded in 1792, and now possesses numerous churches, a courthouse, jail, library, etc. The falls, 50 ft. high, are within the city limits and supply abundant waterpower to the numerous manufactories of the place. The silk industry here is the most important in the United States, the silk mills and silk dyeing establishments giving employment to many thousand hands. There are also large locomotive and bridge works, machine shops and cotton and woolen mills. In addition linens, carpets, velvets, iron goods, and various other articles are made. The city has several academic institutions. Pop. 125,600.

Paterson, WILLIAM, financier and founder of the Bank of England, was born in Dumfriesshire in 1665; died in London in 1719. He went through England as a peddler, settled for a time at Bristol, subsequently resided in the Bahama Islands. Returning to London, he engaged in trade with success, and in 1694 proposed and founded the Bank of England, being one of its first directors. Before this time he had conceived the project of founding a free emporium of trade in Darien, and in 1695 he obtained the sanction of a Scottish act of parliament constituting the Darien Company. (See *Darien Scheme.*) After the failure of this great scheme he returned to England, broken in health and fortune. When the Treaty of Union between England and Scotland was concluded in 1707, Paterson, who was one of its warmest advocates, after much difficulty received an indemnity of £18,000 for the losses he had sustained. Paterson was a great financial genius, but most of his views (such as his advocacy of free-trade) were far in advance of his time.

Pathology (pa-thol'ō-ji), that part of medicine which explains the nature of diseases, their causes and symptoms, comprehending nosology, etiology, and symptomatology. Pathology may be divided into *general pathology*, which regards what is common to a number of diseases taken as a class; and *special pathology*, which treats of individual diseases.

Patiala (pat-ē-ä'lȧ), an Indian native state in the jurisdiction of the Punjab government, the larger part of which is situated south of the Sutlej and the other part in the hill country near Simla; area, 5412 square miles. Besides the usual agricultural products, the state has slate, lead, marble, and copper mines. The Mahárája of Patiala has been of service to the British government on several critical occasions, such as the mutiny of 1857, and for this loyalty he has been rewarded by an increase of territory. Pop. of the state, 1,596,692. The capital is Patiala, 130 miles S. E. of Amritsir. It was founded in 1752 by Sardar Ala Singh, and has a pop. of 53,629.

Patina (pa-tē'na, pat'i-na), in the fine arts, the fine green rust (an alkaline carbonate of copper) with which ancient bronzes and copper coins and medals become covered by lying in particular soils. This, like varnish, is at once preservative and ornamental. An artificial patina is produced by the forgers of antiquities by acting on them with acetic acid, but it is not durable.

Patmore (pat'mōr), COVENTRY KEARSEY DEIGHTON, an English poet, born in 1823. He published his first volume of poems in 1844, became assistant librarian at the British Museum, and associated himself with the pre-Raphaelite movement. His reputation as a poet was established by the publication of the four parts of *The Angel in the House* (1854–63), which he revised in successive editions. Besides this work he published *The Unknown Eros and other Odes*, a poetical anthology called the *Children's Garland*, a *Memoir of B. W. Proctor*, and several contributions to periodicals. He died in 1896.

Patmos (pat'mos), an island of Turkey in Asia, in the Grecian Archipelago, about 26 miles S. S. W. of Samos; greatest length, 12 miles; breadth,

nearly 6. The island is an irregular mass of barren rock, agricultural products are scanty, and the population (mostly Greeks) find their chief occupation in fishing. Near the excellent natural harbor of La Scala is the small town of Patmos, overlooked by the old monastery of St. John, in a grotto of which, it is said, the Apostle John saw his apocalyptic visions. Pop. about 4000.

Patna (pat'nä), a city of Hindustan, in the lieutenant-governorship of Bengal, situated on the Ganges near its junction with the Son and the Gandak, and about 400 miles northwest from Calcutta. It extends for 9 miles along the river, from which its tombs, mosques, and monuments present a fine appearance. On the west side is the suburb of Bankipur, where the government offices and European residences are situated. By reason of its central position and natural advantages the city is an important business mart, and the chief seat of the opium trade. Pop. 134,785.— The district of PATNA has an area of 2079 square miles, for the most flat and exceedingly fertile. The staple crop is rice, and the other products are wheat, barley, cotton, tobacco, and sugar-cane. Pop. 1,624,985.

Patna, a native state in the Central Provinces of India. The country is hilly, and its large forests are infested by tigers, leopards, etc., while about a fourth of its area of 2400 square miles is cultivated. It is now under direct British supervision. Pop. 277,748.

Patois (pà-twä), a French word of unknown origin used to denote a dialect spoken by the rustic, provincial, or uneducated classes.

Paton (pat'on), SIR JOSEPH NOEL, historical painter, was born at Dunfermline, Scotland, in 1821. He studied for some time at the Royal Academy; attracted attention by his outline etchings illustrative of Shakespeare and Shelley; exhibited his first picture of *Ruth Gleaning* at Edinburgh in 1844; gained one of three premiums at the Westminster competition by his fresco of the *Spirit of Religion*, and a prize of £300 by his paintings *Christ Bearing the Cross* and *The Reconciliation of Oberon and Titania*. During the subsequent years he produced many pictures. He also published two volumes of verse. He died in 1901.

Patras (pä'trås), a fortified seaport and important trading town of Greece, in the northwest of the Morea, on the east side of the gulf of same name. The public buildings include several churches, hospitals, and a celebrated castle of great strength, also remains of a Roman aqueduct. There is an important trade in currants. Pop. 37,401 —The Gulf of Patras lies between the northwest part of the Morea and Northern Greece, and communicates on the east with the Gulf of Lepanto.

Patriarch (pā'tri-ark; from the Greek *patria*, tribe, and *archein*, to rule), the antediluvian head of a family; especially, originally applied to the three ancestors of the Hebrew race, Abraham, Isaac, and Jacob. The term at a later period became the title of the presidents of the sanhedrim, which exercised a general authority over the Jews of Syria and Persia after the destruction of Jerusalem. From them the title was adopted by the Christians, who applied it, from the beginning of the 5th century, to the bishops of Rome, Constantinople, Alexandria, Antioch, and Jerusalem. The Patriarch of Rome became the supreme pontiff of the West (see *Popes*), the four heads of the Eastern church preserving the title of patriarch. The Patriarch of Constantinople is the primate of the Greek Church in the Ottoman Empire, and bears the title of *œcumenieal.*

Patrician (pa-trish'an; Latin, *patricius*, from *pater*, father), the name given by the Romans to the members and descendants by blood or adoption of the original *gentes*, houses or clans who, after the plebeians became a distinct order, constituted the aristocracy of the city and territory. See *Rome.*

Patrick (pat'rik; PATRICIUS), ST., the apostle of Ireland, was born about 373 in the British Roman province of Valentia, probably at Nemthur on the Clyde where Dumbarton now is. His father, a decurion in the Roman army, retired to a farm on the Solway, whence, at the age of sixteen, Patrick was carried off by a band of marauders and sold as a slave to the Irish Celts of county Antrim. After six years he made his escape, and, resolving to devote himself to the conversion of Ireland, prepared himself for the priesthood, probably at the monastic institution founded by St. Ninian at Candida Casa (Whithorn) in Galloway. Having been ordained a bishop and received the papal benediction from Celestine I, he went over to Ireland about the year 405. Here he is said to have founded over 360 churches, baptized with his own hand more than 12,000 persons, and ordained a great number of priests. The date of his death is probably 463; it occurred at a place called Saul, near Down-

patrick, and his relics were preserved at Downpatrick till the time of the Reformation. His authentic literary remains consist of his *Confessions* and a letter addressed to a Welsh chief named Corotic. The existence of two other Irish apostles, Patrick or Palladius, and Senn (old) Patrick, about the same time has caused much confusion in the history of the early Irish church.

Patrick, ST., ORDER OF, an Irish order of knighthood, instituted in 1783 by George III, originally consisting of the sovereign, the lord-lieutenant of Ireland for the time being (who is the grandmaster of the order), and fifteen knights; but by a statute in 1833 the order was enlarged and the number of knights raised to twenty-two. The badge of the order is of gold, oval in shape, with the cross of St. Patrick surmounted by a shamrock in the center, and round this is a blue enameled band bearing the motto 'Quis separabit.' The badge is suspended to a collar of roses and harps by means of an imperial crown and gold harp. The mantle and hood are of sky-blue tabinet, lined with white silk.

Patristic Theology (pa-tris'tik), that branch of historical theology which is particularly devoted to the lives and doctrines of the fathers of the church.

Patroclus (pa-trō'klus), in Greek story, the friend of Achilles, whom he accompanied to the Trojan war. His success was at first brilliant; but, Apollo having stunned him and rendered him defenseless, he was slain by Euphorbus and Hector. See *Achilles.*

Patrol (pa-trōl'), a walking or marching round by a guard in the night to watch and observe what passes, and to secure the peace and safety of a garrison, town, camp, or other place; also, the guard or persons who go the rounds for observation.

Patron (pā'trun), in the Roman republic, a patrician who had plebeians, called *clients*, under his immediate protection, and whose interests he supported by his authority and influence. In later times the term patron was applied to every protector or influential promoter of the interests of others; hence the saints who were believed to watch over the interests of particular persons, places, or trades were called *patron saints.* See next article.

Patronage (pā'trun-ij, pat'run-ij), ECCLESIASTICAL, the right of presenting a fit person to a vacant benefice. In the earlier ages the bishops appointed the holders of all benefices, but subsequently when proprietors of lands began to erect and endow churches they obtained the privilege of nominating the clergyman. For a considerable time not only the nomination but also the investiture of the clergy were in the hands of laymen; but the hierarchy began to consider this an infringement of its prerogatives, and several successive popes and councils declared that the investiture was not valid unless it had also received the sanction of the ecclesiastical authority. Ecclesiastical patronage thus came to reside mainly in the pope, and the principal benefices in Europe were filled by Italian ecclesiastics, who were often ignorant of the language of their flocks. In England this led to the Statutes of Provisors (1350–1415), by which persons who should attempt to enforce such appointments were subjected to severe penalties. In England the sovereign is the patron paramount of all benefices which do not belong to other patrons; but a vast number of livings are in the gift of private persons, who possess the *advowson* as attached to their property. (See *Advowson.*) In Scotland the statute which abolished Popery and recognized the reformed religion reserved the right of presentation to lay patrons (1567), and a subsequent statute (1592) asserted the rights of the crown and lay patrons in still stronger terms. On the establishment of Episcopacy the same principle was adopted in the act of 1612, by which presentations were appointed to be directed to the bishop. After the reestablishment of presbytery patronage was abolished (1649). Between this date and 1874 it was several times abolished and restored, an act being finally passed by which the right of choosing their own minister devolved upon the congregation, the former patron to receive as compensation a sum equal to one year's stipend.

Patten (pat'en), SIMON NELSON, economist, born at Sandwich, Illinois, in 1852, became professor of political economy at the University of Pennsylvania in 1888. He wrote *Theory of Social Forces, Development of English Thought, The New Basis of Civilization, Product and Climax,* etc.

Patti (pat'ē), ADELINA MARIA CLORINDA, opera singer, born at Madrid in 1843; received her musical training from her brother-in-law, Maurice Strakosch; made her first appearance in New York in 1859 as *Lucia;* and in 1861 made a brilliant début at Covent Garden, London, in the parts of *Amina, Violetta, Zerlina,* and *Martha.* Subsequently she successfully established her

reputation as an artiste in the chief cities of Europe and America. She married three times, to the Marquis de Caux, 1868, Signor Nicolini, 1883, and Baron Cederstrom, 1899. Her sister CARLOTTA was also a singer of considerable repute.

Pattison (pat'i-sun), MARK, an English writer, born in 1813; died in 1884. He was educated at Oriel College, Oxford; received a fellowship in 1839, and two years subsequently he was ordained and won the Denyer theological prize. In 1853 he was appointed tutor of his college, and in 1861 became rector (or head) of Lincoln College. He devoted himself to university reform, for this purpose made many journeys to Germany, and was assistant-commissioner on the educational commission of the Duke of Newcastle. He was a contributor to the famous *Essays and Reviews*, and published an edition of Pope's *Epistles and Satires* (1869), a work on Isaac Casaubon (1875), a memoir of Milton in the *Men of Letters Series* (1879), the *Sonnets of Milton*, etc.

Pau (pō), a town of France, capital of the department of Basses-Pyrénées, formerly of Béarn, picturesquely situated on a height above the right bank of the Gave-de-Pau, in view of the Pyrenees (10 miles distant), and 58 miles E.S.E. of Bayonne. The most interesting edifice is the castle in which Henry IV was born, crowning a rising ground and overlooking the Gave-de-Pau. It is a large irregular structure, flanked with six square towers. The oldest part is supposed to date from 1363, and the whole is well preserved. Pau is a favorite winter resort, enjoying a mild dry climate and a peculiar stillness of the atmosphere, with no sudden variations of temperature. Pop. (1906) 30,315.

Pauchonti (pạ-chon'ti; *Isonandra polyandra*), a large tree found in the mountain regions of India, and from which a substance of the nature of gutta-percha is procured. The wood of the pauchonti is close-grained and heavy.

Paul (pạl), the apostle, commonly called SAINT PAUL, was born of Jewish parents at Tarsus, in Cilicia, and inherited the rights of a Roman citizen. He received a learned education, and early went to Jerusalem to study under Gamaliel, one of the most celebrated Jewish rabbins. Thus prepared for the office of teacher, he joined the sect of the Pharisees, and became a persecutor of the Christians, to crush whom the sanhedrim employed him both in and out of Jerusalem. He was present at and encouraged the stoning of Stephen, and it was only when he was overtaken by a vision on his way to Damascus that he became a convert to Christianity. His sudden conversion was indicated by the change of his name from *Saul* to *Paul*, and he engaged in the work of an apostle with an ardor that overcame every difficulty. Arabia, Syria, Asia Minor, Greece, and the islands of the Mediterranean were the scenes of his labors. The churches of Philippi in Macedonia, of Corinth, Galatia, and Thessalonica, honored him as their founder; and he wrote epistles to these churches, and to the churches in the chief cities of Greece and Asia Minor. By admitting the Gentiles to the church he incurred the hatred of the Jews, who persecuted him as an apostate. Undismayed, the apostle went to Jerusalem, and was there arrested and brought to Cæsarea, where he was kept a prisoner for two years by the Roman governors Festus and Felix. He appealed, as a Roman citizen, to the emperor; and on his way to Rome, where he arrived in the year 62, he was shipwrecked on the island of Melita. At Rome he was treated with respectful kindness, and there is reason to believe that he for some time regained his liberty. According to the tradition of the early church the apostle suffered martyrdom during the reign of Nero.

Paul, the name of five popes — PAUL I, pope from 757–767, brother of Stephen II, stood on good terms with Pepin and Charlemagne.— PAUL II, pope from 1464–71, a native of Venice, originally called Pietro Barbo, caused a crusade to be preached against the Hussites. — PAUL III, pope from 1534–49, formerly Alessandro Farnese, excommunicated Henry VIII, 1535, concurred in the foundation of the order of Jesuits, opened the Council of Trent, defended himself by his legates in the conferences between Catholics and Protestants at the diets of Worms and Ratisbon, and established a general inquisition for the suppression of the Protestant revolt.— PAUL IV, pope from 1555–59, formerly John Peter Caraffa, energetically directed the power of the Inquisition against the Protestant movement, and established an Index Librorum Prohibitorum.— PAUL V, pope from 1605–21, formerly Camillo Borghese, succeeded Leo XI.

Paul I, Emperor of Russia, son of Peter III and Catharine II, was born in 1754. On the death of Catharine in 1796 he succeeded to the throne, and began his reign with acts of generosity. He put an end to the war with Persia, and liberated the Poles who were in confinement in Russia. He

joined the coalition of crowns against France, and sent 100,000 men, under Suwaroff and Korsakoff, to Italy and Switzerland, and partly to Holland, but he afterwards favored the cause of Napoleon. Paul caused himself to be declared Grandmaster of the Knights of Malta (1798), but Britain, having conquered the island in 1800, refused to surrender it to the Russian emperor. He therefore laid an embargo on all British ships in the Russian ports, and prevailed upon the Swedish, Danish, and Prussian courts to enter into a convention against Great Britain. At length (1801) the internal administration and his increasing acts of tyranny gave rise to a strong popular discontent, and he was murdered in his bed, March 24, 1801.

Paul, ST. VINCENT DE, Roman Catholic philanthropist, born of poor parents in Southern France in 1576; died in 1660. He was educated at Dax and Toulouse; ordained a priest in 1600; in 1605 he was captured by pirates; remained in slavery in Tunis for two years, and finally escaped to France. He afterwards visited Rome, from which he was sent on a mission to Paris, where he became almoner to Queen Margaret of Valois. In 1616 he began the labors which occupied so large a portion of his life, and which included the foundation of the institution called the Priests of the Mission or Lazarists, the reformation of the hospitals, the institution of the Sisterhood of Charity, the instruction of idiots at his Priory of St. Lazare, etc. Among the last acts of his life was the foundation of an asylum for aged working people of both sexes, and a hospital for all the poor of Paris, which was opened 1657. He was canonized in 1737.

Paula, FRANCIS DE. See *Francis of Paula.*

Paulding (pạl'ding), JAMES KIRKE, miscellaneous writer, born in Dutchess county, New York, in 1779; died in 1860. He removed to New York, where he became intimately acquainted with Washington Irving, and published in connection with him a series of humorous and satirical essays, entitled *Salmagundi.* For some years he was secretary of the United States navy. He published a second series of *Salmagundi,* entirely his own composition; several novels, among which are *Konigsmarke,* and the *Dutchman's Fireside;* a *Life of Washington;* and many political pamphlets, poems, etc.

Pauli (pạ'lē), REINHOLD, historical writer, born at Berlin in 1823; died in 1882. He was educated at Berlin and Bonn; resided in London for eight years, where he was secretary to the Prussian minister, and afterwards became a professor successively at Rostock, Tübingen, and Göttingen. His published works are: a *Life of King Alfred* (1851), a continuation of Lappenberg's *History of England,* a *History of England since the Treaties of 1814 and 1815, Pictures of Old England,* a monograph on Simon de Montford, and *Essays on English History.*

Paulicians (pạ-li'shė-ans), a Christian sect founded in the 7th century in Armenia. They rejected the adoration of the Virgin and the saints; refused homage to the cross; denied the validity of the sacraments; interpreted spiritually baptism and the Lord's supper; would not recognize any priestly dignity; and their public worship was altogether free from ritual. They suffered severe persecution at the hands of the Byzantine emperors, but as late as the 16th century remnants of the sect were found in Bulgaria.

Paul's Cathedral, ST., a famous religious edifice of London, England, is situated on Ludgate Hill, an elevation on the north bank of the Thames. The site of the present building was originally occupied by a church erected by Ethelbert, king of Kent, in 610. This was destroyed by fire in 1087, and another edifice, Old St. Paul's, was shortly afterwards commenced. The structure was in the Gothic style, in the form of a Latin cross, 690 feet long, 130 feet broad, with a lead-covered wooden spire rising to the height of 520 feet. The middle aisle was termed Paul's Walk, from its being frequented by idlers as well as moneylenders and general dealers. Old St. Paul's was much damaged by a fire in 1137, by lightning in 1444, again by fire in 1561, and was utterly destroyed by the great fire in 1666. The ruins remained for about eight years, when the rebuilding was taken in hand by the government of Charles II (1675–1710). The whole building was completed at a total cost of £1,511,202 by Sir Christopher Wren, architect. The building is of Portland stone, in the form of a cross. Its length is 510 feet; the width from north to south portico 282 feet; the general height is 100 feet. The whole is surmounted by a great dome raised on eight arches. Above the dome is a lantern or gallery terminated above by a ball and gilded cross, 404 feet from the pavement beneath. The crypt under the nave contains the burying places of many illustrious personages, and some interesting relics of old St. Paul's. Among the

numerous monuments and statues to the illustrious dead may be noted those of John Howard and Dr. Johnson, by Bacon; statues of Nelson, Earl Howe, and Sir Joshua Reynolds, by Flaxman; Bishop Heber, by Chantrey; and monuments to Lord Rodney, Lord Heathfield, Admiral Collingwood, General Abercrombie, etc., by Rossi, Westmacott, and others. The monument to the Duke of Wellington, by Alfred Stevens, is accounted the finest work of its kind in England. It consists of a rich marble sarcophagus and canopy elaborately ornamented with bronze sculptures. It is 30 feet in height and cost upwards of £30,000.

Paul's Cross, St., a structure partly consisting of a pulpit which stood at the north side of old St. Paul's, London; a favorite place of resort, from which sermons, political discourses, etc., used to be delivered. It was demolished in 1643.

Paul's School, St., a London grammar or secondary school, endowed by John Colet in 1512 for 153 boys of 'every nation, country, and class.' The first building, on the east of St. Paul's Churchyard, was burned in 1666; the second, by Wren, was taken down in 1824 and another building erected. In 1884 a new school was opened at West Kensington. The Mercer's Company are patrons.

Paulus Ægineta (pa̤'lus ē-ji-ne'-ta), a Greek medical writer, born, it is supposed, in the 7th century in the island of Ægina, and connected with the medical school at Alexandria. He abridged the works of Galen, and was deeply read in those of Hippocrates and others. His words have been translated into English.

Paulus Diaconus (di-ak'o-nus), an Italian ecclesiastic, born about 730; died about 800. He was educated in the court of the Lombard kings at Pavia. In 781 he was called to the court of Charlemagne, and was one of the principal instruments of the intellectual reforms effected by the emperor in the countries of Western Europe. Paulus drew up a book of homilies from the fathers, wrote a history of the bishops of Metz, and a history of the Lombards.

Paul Veronese. See *Veronese.*

Pauperism. See *Poor* and *Poor's Laws.*

Pausanias (pa̤-sā'ni-us), a Lacedæmonian general, nephew of Leonidas. He commanded the allied Greeks against the Persians at the battle of Platæa in 479 B. C. To himself alone he ascribed the victory, and his pretensions became insupportable when he afterwards, with a combined Greek fleet, delivered Greece, Cyprus, and finally Byzantium from the Persian rule. At length he entered into secret negotiations with Xerxes, and conceived the design of making himself master of Greece. To escape arrest he sought shelter in the temple of Athene at Sparta, where he was shut in by the enraged people and starved to death (B. C. 467).

Pausanias, a Greek writer on mythology, history, and art, who lived in the 2d century after Christ, and of whose personal history nothing is known. His *Hellados Periēgēsis* ('Peregrination of Hellas') is an itinerary in ten books of his travels, which were extensive. He appears to have visited the whole of the Peloponnesus, Rome, Syria, and Palestine. He describes temples, theaters, tombs, statues, pictures, monuments of every sort. He also mentions mountains, rivers, and fountains, and the mythological stories connected with them. His observation is accurate, and his description simple and reliable.

Pausilippo. See *Posilipo.*

Pavement (pāv'ment), a floor or covering consisting of stones, blocks of wood, etc., laid on the ground in such a manner as to make a hard and convenient roadway. Pavements of lava, with elevated sidewalks, are found in the ancient Roman cities of Herculaneum and Pompeii, and the paving of important highways was practiced by the Romans. Of modern cities Paris is generally mentioned as having the oldest pavement; but it is certain that Cordova, in Spain, was paved about 850 A. D. In London some of the chief streets were paved in the 15th century. Holborn was first paved in 1417, the great Smithfield Market not until 1614. Street pavements in modern cities are usually of stone, asphalt, concrete, or wood. The stone commonly used for the carriage way is granite, blocks of which are placed upon a solid bed of concrete, and the interstices filled with sand and grouted with asphalt, lime, or cement. Concrete pavement is composed of broken stone, etc., mixed with Portland or other cement or asphalt. (See *Concrete.*) Trinidad and Venezuelan asphalt is now much used for paving city streets, and bricks and wood blocks are coming into use. Wood pavements have the advantage of being noiseless, and some recent pavements of this kind are very durable. They are laid in different ways, but the

blocks which form the pavement are always placed on their ends, so that the cross surface of the wood is exposed. The spaces between the blocks are usually filled with gravel, upon which hot tar or pitch is poured.

Pavia (pā′vi-a; Italian pron. pȧ-vē′ȧ), a city of Italy, in Lombardy, 22½ miles from Milan, on the left bank of the Ticino, capital of a province of the same name. Pavia is still partly surrounded by old walls and fortifications, and is connected with the Adriatic by the Po and Ticino, and with Milan by a canal. Of edifices the most important are the cathedral (begun in 1486), containing some good paintings, and the tomb of St. Augustine; the church of San Michele, a Romanesque edifice of the 11th century; the Castello, or castle, now a barrack, erected by Galeazzo Visconti, 1360–69; the university, founded in 1361, a handsome building, with a library of about 130,000 volumes; the Collegio Borromeo, etc. The manufactures are unimportant. About 4 miles to the north is the famous Carthusian monastery Certosa di Pavia, with a magnificent church in the Gothic style, begun 1396, and with a façade that ranks as the finest decorative work of the kind in North Italy. Pavia was a place of considerable importance during the reign of Augustus. It afterwards came into the possession of the Lombard kings, who made it their capital. It was latterly under the Milanese. Pop. (1906) 28,796.— The province, which extends on both sides of the Po, has an area of 1285 square miles, partly covered by the Apennines. Pop. 504,382.

Pavilion (pȧ-vil′yun), in architecture, a turret or small building, usually isolated, having a tent-formed roof, whence the name. A projecting part of a building, when it is carried higher than the general structure and provided with a tent-formed roof, is also called a pavilion.

Pavlograd (pȧv-lō-grȧt′), a town of Southern Russia, 16 miles northeast of Ekaterinoslav, in the government of that name. Pop. 17,188.

Pawl (pȧl), a short piece or bar moving round a pivot at one end, so as to catch in a notch or projection of a revolving body and prevent motion in one direction, as in the capstan or windlass of a ship.

Pawnbroker (pȧn′brō-kėr), a person who lends money on goods *pledged* or deposited at a legally fixed rate of interest, and under the restriction of a government license. Although this mode of borrowing is occasionally taken advantage of by all classes, and bankers, when they accept security for their advances, act on the same principle as the pawnbroker, the business, as a special one, originates chiefly in the necessities of the poor. In the middle ages lending upon pledges was a trade almost exclusively pursued by Jews and Lombards. On the European continent this form of borrowing is partly conducted by charitable institutions called Monts de Piété (which see). In England pawnbrokers were recognized by statute in the reign of James I, and in 1872 an act was passed to consolidate all the acts relating to pawnbrokers in Great Britain; but it does not extend to Ireland. In the United States the several states have each their own laws governing pawnbroking. Pawnbrokers have been taxed $20 annually by the Federal government since July 1, 1898.

Pawtucket (pȧ-tuk′et), a city of Providence county, Rhode Island, 4½ miles N.N.E. of Providence. It is situated on the Pawtucket River, which has here a fall of 50 feet, yielding abundant water power. Cotton manufacture in the United States began in this city. Calico printing is done here on the largest scale. The thread works are the largest in the country, and there are extensive bleaching and dyeing factories, with many other manufacturing establishments. Pop. 51,622.

Pax (paks), an ecclesiastical utensil in the Roman Catholic Church, formed usually of a plate of metal, chased, engraved, or inlaid with figures representing the Virgin and Child, the crucifixion, etc., which, having been kissed by the priest during the *Agnus Dei* of the high mass, is handed to the acolyte, who presents it to be kissed by each of the ecclesiastics officiating, saying to them *Pax tecum* (peace to thee). The decorations of the pax are frequently very rich.

Paxo (pak′so; anciently *Paxos*), one of the Ionian Islands, belonging to Greece, 9 miles south of Corfu. It is nearly 5 miles long and 2 broad, and consists of a mass of limestone rock. Principal product, olive oil of the finest quality. Pop. about 5000.

Paxton (paks′tun), Sir Joseph, landscape gardener and architect, born in Bedfordshire in 1803; died in 1865. He was educated at the free school of Woburn; became gardener, and afterwards estate manager, to the Duke of Devonshire at Chatsworth, in Derbyshire; designed the Crystal Palace for the great International Exhibition (London) in

1851, and soon after was knighted. He edited the *Horticultural Register*, the *Magazine of Botany*, the *Cottage Calendar*, and was the author of a *Pocket Botanical Dictionary*. He was elected member of Parliament for Coventry in 1854, and continued to represent it until his death.

Pax-wax, the name given to the strong, stiff tendons running along the sides of the neck of a large quadruped to the middle of the back, as in an ox or horse. It diminishes the muscular effort needed to support the head in a horizontal position.

Paymaster (pā'mas-tėr), an officer in the army and navy, from whom the officers and men receive their wages, and who is intrusted with money for that purpose. In matters of general discipline the paymaster is subordinate to the commanding officer of his regiment. The paymaster of a ship in the navy has a general charge of the financial department in the vessel.

Payn (pān), JAMES, novelist, born at Cheltenham, England, in 1830; educated at Eton, Woolwich Academy, and Trinity College, Cambridge; published two volumes of verse; contributed to the *Westminster Review* and *Household Words;* became editor of *Chambers's Journal* in 1858, and of the *Cornhill Magazine* in 1882. He published innumerable novels, of which the following may be mentioned: *Lost Sir Massingberd, A County Family, Found Dead, By Proxy, The Talk of the Town, The Luck of the Darrels, The Heir of the Ages.* He died in 1898.

Payne, JOHN HOWARD, was born in New York in 1792. He adopted the stage as his profession, but is especially known as the author of the favorite song of *Home, Sweet Home.* In 1851 he was sent as consul to Tunis, where he died in 1852.

Pays de Vaud (pa-ē dė vō). See *Vaud.*

Paz, LA. See *La Paz.*

Pea (pē), a well-known leguminous plant of the genus *Pisum*, the *P. sativum* of many varieties. It is a climbing annual plant, a native of the south of Europe, and has been cultivated from remote antiquity. It forms one of the most valuable of culinary vegetables; contains much farinaceous and saccharine matter, and is therefore highly nutritious. It is cultivated in the garden and in the field. Its seed-vessel is a pod containing one row of round seeds, which are at first soft and juicy, in which state they are used for the table under the name of *green peas.* They afterwards harden and become farinaceous. A whitish sort, which readily split when subjected to the action of millstones, is used in considerable quantities for soups, and especially for sea-stores. There is a blue sort which answers the same purpose.

Pea-beetle, a coleopterous insect (*Bruchus pisi*) about ¼ inch long, black, with white spots and dots on the wing-cases, very destructive to crops of peas in the south of Europe and in North America. Called also *Pea-bug, Pea-chafer,* and *Pea-weevil.*

Peabody (pē'bo-di), GEORGE, philanthropist, born at Peabody, Massachusetts, in 1795; died in 1869. In 1837 he went to London and established the firm of George Peabody & Co., exchange brokers and money-lenders. Having acquired a large fortune, he gave $200,000 to establish a free library in his native town; presented $1,000,000 to found a free library and institute of art and science at Baltimore; and in 1862 placed $750,000 in the hands of trustees for the benefit of the poor of London, to be employed in building model dwelling houses. He afterwards added $1,750,000 to this benefaction. In 1866 he made a gift of $2,100,000, afterward increased to $3,500,000, for the cause of education in the South. In the same year he gave $150,000 to Harvard University to found a museum for anthropological and archæological research. This institution has sent out many exploring expeditions and done very valuable work.

Peabody, a village of Essex Co., Massachusetts, 2 miles W. of Salem. It contains the Peabody Institute, with a large library and a collection of paintings, etc. The place was named in honor of George Peabody, who was born here, and has various manufactures. Pop. 15,721.

Peace (pēs), RELIGIOUS, the name given in German history to a series of treaties by which, after the Reformation, the Protestant States were secured in the exercise of their religion.

Peace, INTERNATIONAL. The first national movement in the direction of bringing about a permanent condition of peace between the nations, of an international character, was the conference held in 1899, at The Hague, Holland, at the suggestion of the Czar of Russia, to consider what could be done in the way of reducing the armaments of the nations and inducing them to settle their differences by arbitration instead of war. The most important result of this conference of the nations was the establishment at The Hague of a Permanent Interna-

tional Court of Arbitration, which has since then settled amicably a number of international disputes. One of the most important of these was the settlement in 1910 of the long-standing fishery controversy between the United States and Great Britain. A second conference was held at The Hague in 1907, the results of which greatly strengthened the influence of its arbitration court, and provided for the establishment of a Court of Arbitral Justice composed of distinguished legal and diplomatic representatives of nearly all the nations of the world. Various minor steps have been taken in this direction, the American Peace Society, a long-standing institution, having grown in influence, while an International School of Peace has been established in Boston. Peace conferences have been held on several occasions, attended by many people of influence, that at Chicago in 1909 being attended by delegates from 32 states. For many years past annual Conferences on International Arbitration have been held at Lake Mohonk, New York, attended by representative bodies of important delegates. The Nobel prize for the most efficient work in the advancement of peace is given annually to some person of note, President Roosevelt being its recipient in 1906, in recognition of his useful services in bringing about a treaty of peace between Russia and Japan. In response he made an address on International Peace at Christiania, Norway, in 1909, which was full of fertile suggestions, the most important being that the Great Powers of the world should unite in a League of Peace, with force and authority sufficient to enable it to dominate any nation that sought to engage in unjustifiable war. The Nobel prize for 1910 was given to the International Peace Bureau, at Berne, Switzerland. The latest and one of the most vital steps in the direction of international peace was that taken by Andrew Carnegie in December, 1910, when he donated the sum of $10,000,000, the income of which, amounting to $500,000, was to be used annually in the support and furtherance of all movements in the direction of peace. The trustees of this fund comprise a number of the most distinguished citizens of the United States, with U. S. Senator Elihu Root, of New York, as chairman. This large donation, in connection with the work of The Hague Court and other peace organizations, cannot fail to exercise great influence in the desired direction. In 1911 treaties in favor of arbitration in international disputes of practically every character were negotiated between the United States and England and France and were ratified by the United States Senate in 1912. In conclusion it is well to state that the organization of Socialists, now grown large and powerful in several nations, has the establishment of international peace as one of its leading objects.

Peace River, a large river of Canada, which rises in the mountains of British Columbia, flows northeastwards, receives the drainage of Lake Athabasca, and finally enters the Great Slave Lake under the name of the Slave River. It is 600 miles in length, and is navigable for a large part of its course.

Peach (pēch), a tree and its fruit, of the almond genus (order Rosaceæ), the *Amygdălus persica*, of many varieties. This is a delicious fruit, the produce of warm or temperate climates. The tree is of moderate stature, but varies in this respect according to soil and climate. The varieties of the fruit, which is a large downy drupe containing a stone, are very numerous, differing in size, flavor, and time of ripening, but they are principally of two sorts, the *free-stones* and the *cling-stones*, so called according as the stone separates readily or adheres to the flesh. The peach-tree is supposed to have been introduced into Europe from Persia. In the United States it is very extensively cultivated, great quantities being supplied by the South to the Northern market and other great quantities being canned for winter use and export. The ripe fruit is occasionally distilled and made into peach brandy. The nectarine is a smooth variety of the peach.

Peacock (pē′kok), called also Peafowl, a large and beautiful gallinaceous bird of the genus *Pavo*, properly the male of the species, the female being, for distinction's sake, called a *pcahen*. The common peacock, *P. cristātus*, is a native of India and Southeastern Asia. This bird is characterized by a crest of peculiar form, and by the tail coverts of the male extending far beyond the quills, and being capable of erection into a broad and gorgeous disk. The shining, lax, and silky barbs of these feathers, and the eye-like spots which decorate their extremities, are known to every one. The colors and plumage are said to be more brilliant in the wild than in the domesticated state. The wild peahen lays from twenty-five to thirty eggs, and produces only a single brood in each year. The young birds of both sexes are feathered alike for the first two years; and in the third year the tail-coverts of the male begin to be developed and to

assume their lustrous appearance. The black-shouldered or Japan peacock (*P. nigripennis*) is regarded as a variety of the common species; the Javan peacock (*P. muticus*) is a distinct form.

Peacock, Thomas Love, an English writer, born in 1785; died in 1866. His first important work was a novel entitled *Headlong Hall*, published in 1815, and this was followed by *Melincourt*, *Nightmare Abbey*, *Maid Marian*, *The Misfortunes of Elphin*, *Crotchet Castle*, *Gryll Grange*, and a poem called *Rhododaphne*. He was the friend and executor of Shelley, and was connected with the East India Office for nearly forty years.

Peacock-butterfly, a name given by collectors of insects to butterflies of the species *Vanessa Io*, from the eyes on their wings resembling the eyes on peacocks' feathers.

Peacock-fish, a fish of the Mediterranean and Indian seas (*Crenilabrus pavo*), characterized by the brilliancy of its hues — green, yellow, and red.

Pea-crab, a small brachyurous crustacean of the genus *Pinnothēres*, which lives in the shells of oysters, mussels, and other bivalves. There are several species in the United States.

Peak (pēk), or High Peak, a district of England, forming the northwest angle of Derbyshire, and consisting of a wild and romantic tract, full of hills, valleys, and moors, and celebrated for its limestone caverns and grottoes.

Peale (pēl), Charles Wilson, painter and naturalist, was born at Charlestown, Maryland, in 1741; died in 1827. He studied under West in England, and afterwards settled in Philadelphia, where he won a high reputation as a portrait painter. He was one of the founders of the Academy of the Fine Arts, and formed in Philadelphia a museum of natural curiosities, containing the skeleton of a mammoth. It was known as Peale's Museum.

Peale (pēl), Rembrandt, artist, son of the preceding, was born in Bucks county, Pennsylvania, in 1778. When 17 years old he executed a portrait of Washington, from whom he had three sittings. He painted portraits of many distinguished men. He was president of the American Academy, and also one of the original members of the Academy of Design. His portrait of Washington (1823) was purchased by Congress. He died in 1860.

Pea-maggot, the caterpillar of a small moth which lays its eggs in peas.

Pea-nut. Same as *ground-nut*.

Pear (pār), a tree of the genus *Pyrus*, order Rosaceæ, the *P. communis*, growing wild in many parts of Europe and Asia, and from which the numerous cultivated varieties have originated. The fruit is characterized by a saccharine aromatic juice, a soft and pearly liquid pulp, melting in the mouth, as in the butter-pear; or by a firm and crisp consistence, as in the winter bergamots. The pear is chiefly propagated by grafting or budding on the wild pear stock, or on stocks raised from the seeds of cultivated pears, called free stocks. It is also grafted on the quince, the medlar, and the white thorn. At the present day more than 200 varieties are enumerated, and constant accessions are made every year. France and the north of Italy are celebrated for the perfection to which they have carried the culture of this fruit, and it is largely cultivated in the United States. Numerous varieties are cultivated solely for the purpose of making perry, a liquor analogous to cider, and prepared nearly in the same manner. The wood is fine-grained, of a yellowish color, and susceptible of a brilliant polish. In the early ages of Greece it was employed in statuary; now it is used for musical instruments, the handles of carpenters' tools, in wood-engraving, etc.

Pearl (perl), the name applied to a concretion produced within the shells of certain species of bivalve molluscs as the result of some abnormal secretory process. These concretions are highly valued, and are classed among the gems. The production of a pearl is generally begun by the introduction of some foreign body, such as a grain of sand, within the mantle-lobes. The presence of this body has the effect of setting up an irritant action, resulting in the deposition by the mantle of a quantity of nacreous material over the offending particle. This material, in certain species of molluscs, is of such a texture and character, and is deposited in such regular laminæ or layers, that in due time the structure known as a 'pearl,' varying in worth and brilliancy, is formed. Chief among such molluscs are the pearl-oyster (*Meleagrina margaritifĕra*), the pearl-mussel (*Avicŭla margaritifĕra*), and the fresh-water mussels (genus *Unio*).

The chief pearl-oyster fisheries are those of Ceylon, which, together with the fisheries in the Persian Gulf, were known to the ancients. The chief seat of the Ceylon fishery is in the Gulf of Manaar, on the northeast of the island. It be-

gins in February or March, and extends over a period of about a month, a large fleet of boats usually being engaged in it, The average depth at which the oysters are found varies from 60 to 70 feet, and the divers are let down by a stout rope weighted by a heavy stone. Having gathered a number of the oysters into a net, at the end of half a minute or so the diver is pulled up. The oysters being carried to shore, and laid in piles, in about ten days become thoroughly decomposed. They are then thrown into sea-water, and carefully examined for pearls; while the shells, after being cleaned, are split into layers for the sake of the mother-of-pearl. The pearl-fisheries of Ceylon are a government monopoly, but the revenue derived from them is not a regular one, the fishery sometimes failing for years in succession. There was no fishery, for example, between 1837 and 1854, or between 1863 and 1874. The best pearls are found about Ceylon, Persia, and other eastern coasts, and inferior ones on the tropical coasts of America. The pearl-oyster occurs throughout the Pacific. Very fine pearls are obtained from the Sulu Archipelago on the north-east of Borneo. Of late years pearl-fishing has been started with considerable success in Australian seas; and it is carried on also in the Gulf of Mexico, upon the coast of California, and in the vicinity of Panama. Pearls are also to some extent obtained from the fresh-water mussels of the streams, especially in China, also in the United States and Germany. The British rivers have yielded valuable pearls, but the fisheries there are now neglected as unprofitable, and findings of this kind in the United States are only occasionally made.

Pearls have formed valued articles of decoration and ornament from the earliest times. Julius Cæsar presented Servilia, the mother of Marcus Brutus, with a pearl valued in modern computation at $240,000; while Cleopatra is fabled to have swallowed one gem valued at $300,000 or $400,000. A pearl purchased by the traveler Tavernier is alleged to have been sold by him to the Shah of Persia for £180,000. The 'Pilgrim' pearl of Moscow is diaphanous in character, and weighs 24 carats.

Artificial pearls are largely made in France, Germany, and Italy, the pearl being very well imitated by the scales of certain fishes. A substitute for black pearls is found in close-grained hæmatite, not too highly polished, and pink pearls are imitated by turning small spheres out of the rosy part of the conch-shell.

Pearl, Mother of. See *Mother-of-pearl.*

Pearl-ash, the common name for carbonate of potassium. See *Potash.*

Pearl Barley. See *Barley.*

Pearl Moss, the same as *Carrageen* (which see).

Pearl Powder. See *Bismuth.*

Pearl Stone, a felspathic mineral, consisting of silicate of aluminum with varying quantities of iron, lime, and alkalies; it occurs in spherules, which have a pearly luster.

Pearly Nautilus, a name for the common nautilus. See *Nautilus.*

Pearson (pēr'sun), John, an English prelate, born at Snoring, Norfolk, about 1613; died in 1688; educated at Eton and Cambridge. He took orders in 1639, and held successively the livings of Torrington in Suffolk, and of St. Clement Eastcheap, London. He became professor of divinity at Cambridge in 1661, and Bishop of Chester in 1672, and was considered one of the most learned Englishmen of his time. His chief work is an *Exposition of the Creed* (1659).

Peary, Robert Edwin, a famous Arctic explorer, was born at Cresson Springs, Pennsylvania, in 1856, and entered the civil engineer corps of the United States Navy in 1881. His first expedition northward was made in 1886, when, with one companion, he penetrated the Greenland ice-cap for 100 miles in lat. 69° 30′ N. In 1891, with a party of six, he went to Northern Greenland and made a brilliant sledge journey of 1300 miles, crossing Greenland to its Atlantic coast and discovering Independence Bay in lat. 81° 37′ N. He made a second expedition in 1893-95, again crossing Greenland, and in 1897 voyaged to Cape York and brought back an immense meteorite discovered there. In 1898 he went north again, on this occasion the discovery of the North Pole being his main object. He remained until 1902, making efforts to cross the ice of the Arctic Sea by means of dog sledges, and reaching the high altitude of 83° 39′ N. lat. He also traced the north coast of Greenland, thus proving Greenland to be an island. In 1905 the indefatigable explorer set out again and in this expedition reached 87° 6′ N. lat., the highest point to that date attained in the northern seas. Dissatisfied with his achievements while the pole remained

PEARY'S SHIP CAUGHT IN A GREAT ICE FIELD OF THE NORTH

To have the ship surrounded by a great expanse of broken ice, or to be frozen in by the formation of new ice, is the common experience of the polar explorer. Peary's vessel is seen here in this hazardous predicament. The view also gives some idea of the grandeur and extent of Arctic scenery.

undiscovered, he embarked on a sixth expedition in 1908, and in the spring of 1909 achieved the purpose to which his life had been devoted, attaining the pole, the northern extremity of the earth, on April 6. For a time it seemed as if the honor of this great achievement would be lost to him, Dr. Frederick A. Cook, of Brooklyn, who had been for a year or two lost to sight in the North, returning on Sept. 1, 1909, with the statement that he had reached the pole on April 21, 1908. Investigation of his story, however, proved its falsity, and the full credit of the discovery was left to the unwearying Peary.

Peasant Proprietors (pez'ant), the owners of relatively small estates of land which they cultivate themselves; the term deriving its specific meaning and importance from the theories of a class of economists represented on the European Continent by Sismondi, and in Britain by John Stuart Mill. See *Land.*

Peasants' War, a great insurrectionary movement among the German peasantry, which in 1525 spread over the whole of Germany. The immediate cause of this movement was religious fanaticism, but the pent-up forces by which it was impelled grew out of the long course of oppression to which feudal customs and priestly tyranny had subjected the people. Before the Reformation, particularly from 1476 to 1517, a series of popular commotions and insurrections had broken out in various parts of Southern Germany, without procuring any relaxation of burdens. The Reformation gave hopes of relief, and though Luther and Melanchthon opposed the idea of carrying out a religious and a social revolution simultaneously, a general ferment among the peasantry came to a head on Jan. 1, 1525, with the capture of the convent of Kempten (Bavaria). A general unorganized rising of the German peasantry followed, fearful excesses and atrocious cruelties were committed, but in a few months the mobs were dispersed or massacred by the soldiery of the nobles. It is estimated that 150,000 persons lost their lives in these risings, which for the time gave a severe blow to the Reformation. See also *Anabaptists; Jacqueric.*

Pea-stone, or PISOLITE (pis'o-līt), a limestone rock, composed of globules of limestone about the size of a pea, usually formed round a minute grain of sand or other foreign body, and joined with a cement of lime. In pisolitic rocks belonging to the Oolitic period ironstone is frequently found.

Peat (pēt), a kind of turfy substance consisting of vegetable matter which has accumulated by constant growth and decay in hollows or moist situations on land not in a state of cultivation, always more or less saturated with water, and consisting of the remains, more or less decomposed, of mosses and other marsh plants. Peat is generally of a black or dark-brown color, or when recently formed, of a yellowish-brown; it is soft and of a viscid consistence, but it becomes hard and darker by exposure to the air. When thoroughly dried it burns, giving out a gentle heat without much smoke; accordingly it is used as fuel.

Pea-weevil. See *Pea-beetle.*

Peba (pē'ba), a species of the armadillo (*Tatusia septemcinctus*) found in various parts of South America. Its flesh is much valued by the natives.

Pebble (peb'l) in jewelry, a name commonly given to an agate. Scotch agates are commonly known as *Scotch pebbles.*

Pebrine (peb'rin), a French name for a destructive epizoötic disease among silkworms due to internal parasites, which swarm in the blood and all the tissues of the body, passing into the undeveloped eggs of the females, so that it is hereditary, but only on the side of the mother. It is contagious and infectious, the parasitic corpuscles passing from the bodies of the diseased caterpillars into the alimentary canal of healthy silkworms in their neighborhood.

Pecan (pē-kan'), PECAN-NUT, a species of hickory (*Carya olivæformis*) and its fruit, growing in the United States, especially in Texas. It is a large tree, with hard, very tough wood, pinnate leaves, and catkins of small flowers. The nut it yields is very palatable and is a favorite for table use.

Peccary (pek'a-ri; *Dicotyles*), a genus of Ungulate quadrupeds, included in the Artiodactyle ('even-toed') section of that order, and nearly allied to swine, in which family (Suidæ) the genus is classified. These animals are exclusively confined to America, in which continent they represent the true swine of the Old World. In general form the peccaries resemble small pigs. The best-known species are the collared peccary (*Dicotyles torquātus*) and the white-lipped peccary (*D. labiātus*). The former occurs abundantly in South America, and also extends into North America, living generally in small flocks, which do not hesitate to attack with their tusks any one who meddles with them. Their food consists of maize,

potatoes, sugar-cane, and similar materials, and cultivated fields suffer much from their raids. This species of peccary is readily domesticated. The flesh is savory, and less fat than pigs' flesh. *D. labiātus* is exceedingly pugnacious and is a dangerous animal to encounter.

Collared Peccary (*Dicotyles torquātus*).

The peccary possesses a glandular sac or pouch, situated in the loins, which secretes a strongly-smelling fluid of fœtid nature. This must be cut away immediately on killing a peccary, to avoid contaminating the flesh.

Pe-chi-li (pe-chē-lē'), a province of China. Chief city, Peking.

Peck (pek), the fourth part of a bushel; a dry measure of 8 quarts for grain, pulse, etc. The standard or imperial peck contains 2 gallons or 554.548 cubic inches.

Pecopteris (pe-kop'tėr-is), the name given to a genus of fossil ferns occurring in the Coal-measures, New Red Sandstone, and Oolite, from the comb-like arrangement of its leaflets.

Pecos River (pā'kōs), a river of New Mexico and Texas, which has a southeasterly course of about 800 miles, and falls into the Rio Grande del Norte, but in summer is generally dry.

Pecquet (pek-ā), JEAN, born at Dieppe, France, about 1620; died in 1674. He studied medicine, and especially anatomy, at Montpellier, in his studies discovering and demonstrating the course of the lacteal vessels in the human body.

Pecten (pek'ten), a genus of Lamellibranchiate Mollusca, included in the oyster family (Ostræidæ), and popularly designated under the name of 'scallop-shells.' Numerous species of pecten — 180 or more — are known. The common pecten (*P. operculāris*) and the frill or great scallop (*P. maximus*) are the most common forms. The latter form is esteemed a delicacy. The shell of this species was borne in the middle ages by pilgrims in their hats, as a sign that they had visited the Holy Land. The shell is somewhat rounded, and terminates superiorly in a triangular 'ear,' in which the hinge exists. The name 'pecten' (Latin for 'comb') is derived from the indentation of the edges and surfaces of the shell.

Pectinibranchiata (pek-tin-i-brąn-ki-ā'ta), those gasteropods having pectinated branchiæ or gills, as the purple shells (*Murex*), whelk (*Buccĭnum*), cowries (*Cyprœa*), etc.

Pectolite (pek'tu-līt), a mineral consisting of a silicate of lime and soda. It is a tough grayish or whitish mineral occurring in trap-rocks, in aggregated crystals of a silky luster, arranged in sparlike or radiated forms. Called also *Stellite*.

Peculiar (pe-kūl'yar), in canon law, a particular parish or church which has jurisdiction within itself, and exemption from that of the ordinary or bishop's court. The *Court of Peculiars*, in England, is a branch of the Court of Arches which has jurisdiction over all the parishes in the province of Canterbury which are exempt from the ordinary jurisdiction, and subject to the metropolitan only.

Peculiar People, a small sect of English religionists whose special doctrine seems to be the efficiency of prayer without the use of any efforts on their own part. In sickness they reject the aid of physicians, accepting the exhortation of St. James v, 14, 15 in a strictly literal sense. They are called also *Plumstead Peculiars*, from the place of their origin.

Peculium (pe-kū'li-um), private property; specifically, in Roman law, that which was given by a father or master to his son, daughter, or slave, as his or her private property.

Pedagogy (ped'a-gō-ji), the science of teaching, or the systematic developing of the human faculties. Its ideal is to study the individual natures of youth, in order to train each in the special functions or talents with which he or she is endowed, so as to develop their minds in the most effective direction.

Pedals (ped'alz), parts of the mechanism of a musical instrument acted on by the feet. Pedals are used for different purposes in different instruments. In the organ they are used in two distinct ways: first, to act on the swell and stops when the instrument is played with the hands; second, to act upon a distinct set of pipes, called the

pedal organ, and which are played independently. On the pianoforte there was at first only one pedal, used to raise the dampers and prolong the sound after the fingers were lifted from the keys; a second was used to soften the notes, and is called the soft or una-corda pedal; a third has of late years been introduced, which arrests the sound immediately after the note is struck, and produces an artificial staccato. In the harmonium the pedals supply the instrument with wind.

Pedee (pē-dē′), GREAT and LITTLE, two rivers in the United States. The former rises in North Carolina, enters South Carolina, and falls into the Atlantic; total course, 360 miles, of which 200 miles are navigable for boats of 60 or 70 tons. Little Pedee rises in North Carolina, and enters the Great Pedee 32 miles above its embouchure.

Pedestal (ped′es-tal), an insulated basement or support for a column, a statue, or a vase. It usually consists of a base, a dado, and a cornice. When a range of columns is supported on a continuous pedestal the latter is called a *stylobate*.

Pedetes (pe-dē′tes; Gr. *pēdētēs*, a leaper), a genus of rodent mammals, of the mouse family, of which the best-known species is *P. capensis* (the jumping-hare of South Africa).

Pedicel (ped′i-sel), in botany, the stalk that supports one flower only when there are several on a peduncle. Any short and small footstalk, although it does not stand upon another footstalk, is likewise called a pedicel.

Pedicellariæ (ped-i-sil-ā′ri-a), certain minute organisms or structures found attached to the skin or outer surface of star-fishes, sea-urchins, and other Echinodermata. Each pedicellaria consists essentially of a stalk attached to the organism, and bearing at its free extremity two or more movable blades or jaws, which close and open on foreign particles so as to retain them. The exact nature of these structures is still a matter of doubt.

Pedic′ulus. See *Louse*.

Ped′igree. See *Genealogy*.

Pedilanthus (ped-i-lan′thus), a genus of South American plants belonging to the nat. order Euphorbiaceæ, of which one species (*P. tithymaloides*), used medicinally in the West Indies, is known under the name of ipecacuanha, and is employed for the same purpose as that drug.

Pediment (ped′i-ment), in classic architecture, the triangular mass resembling a gable, above the entablature at the end of buildings or over porticoes. The pediment is surrounded by a cornice, and is often ornamented with sculpture. The triangular finishings over doors and windows are also called pediments. In the debased Roman style the same name is given to these same parts, though not triangular in their form. In the architecture of the middle ages small gables and triangular decorations over openings, niches, etc., are called pediments.

Pedipalpi (ped′i-pal-pi), an order of arachnidans. It comprises the scorpions, together with certain other animals.

Pedometer (pe-dom′e-tėr) is an instrument like a watch, which serves to indicate the distance a pedestrian traveler has gone, or rather the number of paces he has made. See *Passometer*.

Pedro II, Emperor of Brazil, was born at Rio Janeiro in 1825; succeeded to the throne on the abdication of his father, Dom Pedro I, in 1831, and married the Princess Theresa Christina Maria (died 1890), sister of Francis I, king of Naples, in 1843. Brazil prospered greatly under the rule of Pedro II, who did much to develop its resources in every direction. In 1871 he issued an imperial decree for the gradual abolition of slavery, which totally ceased in Brazil in May, 1888. In 1889 a revolt of republicans took place and he was put on board ship and sent to Europe, the successful revolutionists establishing a republic. He spent the remainder of his life in Europe and died in 1891.

Peduncle (pe-dung′kl), in botany, the stem or stalk that supports the fructification of a plant, *i. e.*, the flower and the fruit.

Peebles (pē′blz), or TWEEDDALE, an inland county in Scotland, between Dumfries, Selkirk, Edinburgh, and Lanark; area, 356 square miles. The greater part of the surface consists of mountain, moor, and bog, and the main industry is sheep farming. Highest summit, Broad Law, 2723 feet, near the south border. White and red freestone are common in the northern part of the county, and both coal and limestone have been wrought at various points. The Tweed is the only river of any note. Pop. 15,066.— PEEBLES, capital of the above county, on the Tweed, is a favorite summer resort. The manufacture of tweeds and other woolen stuffs is carried on. Peebles was made a royal burgh in 1367. Pop. 3095.

Peechi. See *Dauw.*

Peekskill (pēks'kil), a town of Westchester county, New York, on the E. bank of the Hudson, 42 miles N. of New York City. Here is the Peekskill Academy and other academic institutions, and manufactures of boilers, stoves, hollowware, bricks, hats, liquors, etc. Pop. 15,245.

Peel (pēl), a seaport town and popular watering place on the west coast of the Isle of Man. It has important fisheries. On St. Patrick's Isle, joined to the mainland by a causeway, are the ruins of St. German's Cathedral and of Peel Castle. About 3 miles to the southeast is Tynwald Hill, celebrated in connection with the passing of the Manx laws. Pop. 3600.

Peel, Sir Robert, a British statesman, was born February 5, 1788, near Bury in Lancashire. His father, who had raised himself from a comparatively humble station to be the largest cotton manufacturer in the world, was created a baronet in 1800, and left behind him a fortune of nearly £2,000,000,

Sir Robert Peel.

of which the largest share was inherited by his eldest son, Robert. Young Peel was sent to Harrow and Oxford, where he took his bachelor's degree in 1808, with double first-class honors. Immediately on attaining his majority he was elected member of Parliament for Cashel; in 1810 he became under-secretary of state for the colonies, and in 1812-18 he was chief secretary for Ireland. In 1817 he was elected representative of the University of Oxford, and in 1830 succeeded his father as baronet. In the election of 1832 he was returned for Tamworth, for which he continued to sit during the remainder of his life. On the dismissal of the Whig government in 1834 Peel undertook the government, but his party in the house being in a minority the task was hopeless. After a brief struggle the ministry resigned, and were succeeded by the Whig ministry of Lord Melbourne, which lasted from 1835 to 1841. The general election of 1841 gave a large majority to Sir Robert Peel, and the formation of a Conservative ministry could no longer be delayed. In 1844 and 1845 he passed his celebrated English and Scotch Banking Acts. During the recess in 1845 the potato-rot and famine in Ireland brought the question of the corn-laws to a crisis, and Peel declared in favor of their total repeal. The act repealing the corn-laws (after a modified duty for three years) was passed June 26, 1846. On the same day the ministry was defeated in the House of Commons on the Irish Coercion Bill, and on the 29th of June Peel resigned the premiership. As leader of the opposition he supported many of the measures of the government of Lord John Russell, who succeeded him; but the policy of Lord Palmerston after the revolution crisis of 1848-49 evoked from him a more active hostility to the ministry. On June 29, 1850, he was thrown from his horse, and received injuries of which he died on July 2. By his will he renounced a peerage for his family, as he had before declined the Garter for himself.

Peele, George, one of the poets of Shakespeare's time, was born in Devonshire about 1558, and educated at Oxford, where he made a great reputation. Ultimately he settled at London as a theatrical writer, and was the associate of Nash, Marlowe and Greene. Of the many dramas of which he was reputed to be the author only a few are certainly known to be his, among these few being *The Chronicle History of Edward I.* He died in 1598.

Peele-Tower, or simply Peel, the name given on the Scottish borders to small residential towers erected for defense against predatory excursions. They were usually square buildings with turrets at the angles. The lower part was vaulted, and served for the accommodation of horses and cattle.

Peep-o'-day Boys, the name given to those insurgents who appeared in Ireland in 1784, shortly after the volunteer movement. They were so named from visiting the

houses of the 'defenders,' their antagonists, at daybreak in search of arms.

Peepul (pē'pul), PIPUL, or SACRED FIG (*Ficus religiosa*), a species of fig-tree common in India, and held sacred by the Hindus and Buddhists. Its leaves are heart-shaped on long stalks. It attains a great age, and is usually planted near temples, where it affords shelter to the devotees. Vishnu is said to have been born under a peepul-tree. Its fruits are edible, but not much esteemed.

Peer (pēr; French, *pair*, from Latin *par*, equal), in general, signifies an equal, one of the same rank and station. In this sense it is used by the common law of England, which declares that every person is to be tried by his peers. Peer also signifies in Britain a member of one of the five degrees of nobility that constitute the *peerage* (duke, marquis, earl, viscount, baron), or more strictly a member of the House of Lords. The dignity and privileges of peers originated with the growth of the feudal system, the peers being originally the chief vassals holding fiefs directly from the crown, and having, in virtue of their position, the hereditary right of acting as royal counselors. Subsequently not all the crown vassals appeared at court as advisers of the king, but only those who were summoned to appear by writ. This custom grew at length into a rule, and these summonses were considered proofs of hereditary peerage. In later times the honor of the peerage has been exclusively conferred by patent. As regards their privileges all peers are on a perfect equality. The chief privileges are those of a seat in the House of Lords, of a trial by persons of noble birth in case of indictments for treason and felony, and misprision thereof, and of exemption from arrest in civil cases. The British peerage collectively consists of peers of England, of Scotland, of Great Britain, of Ireland, and of the United Kingdom, but only a portion of the Scotch and Irish peers are peers of Parliament.

Pegasus (peg'a-sus), in Greek mythology, a winged horse, the offspring of Poseidon and Medusa. Bellerophon made use of Pegasus in his fight with the Chimæra. (See *Bellerophon.*) With the stroke of his hoof Bellerophon called forth the sacred well Hippocrene, on Mount Helicon, from which he was in later times called the horse of the muses.

Peg'asus, a genus of acanthopterous fishes allied to the gurnets. *P. draco*, or sea-dragon, inhabits the Indian seas.

Pegmatite (peg'ma-tīt), a coarse granite rock, composed mainly of felspar and quartz, used in the manufacture of porcelain.

Pegu (pe'gö), now a division of Lower Burmah, but previous to 1757 a powerful and independent kingdom, and from that period up to 1853 a province of the Burmese Empire, from which it was severed and annexed to the British dominions in 1853. The province comprised the whole delta of the Irrawady; area, 25,964 square miles; pop. 2,323,512. The modern division of Pegu lies mainly on the east of the lower Irrawady; area, about 13,000 sq. miles; cultivated area, 2043 square miles; pop. 1,819,000. Chief town, Rangoon.

Pegu, an ancient city in the Pegu division of Lower Burmah, on the left bank of the Pegu River, about 70 miles north from Rangoon. Founded in the sixth century A.D., and long the capital of the kingdom of the same name, it was formerly a place of great size, strength, and importance, but was destroyed in 1757 by the Burmese. A new town has been built on the site of the old. Pop. (1901) 14,132.

Pehlvi, or PEHLEVI. See *Persia — Language.*

Pei-ho (pā-hō'), a river of Northern China, rises near the Great Wall, and flows southeast to the Gulf of Pechelee. It is navigable for boats to within 20 miles of Peking, which it passes at the distance of about 10 miles. At its mouth is the small town of Taku, with several forts, which acquired some note in the war with the British and French in 1860.

Peine Forte et Dure (pen fort e dür), a punishment formerly inflicted upon a prisoner who refused to plead guilty or not guilty when put on trial for felony. He was put into a low dark chamber, and laid on his back naked, on the floor. As great a weight of iron as he could bear was then laid upon him, and in this situation bread and water were alternately his daily diet till he died or answered.

Peipus (pe'i-pŭs), a lake of Russia, between the governments of St. Petersburg, Revel, and Livonia; length, 55 miles; breadth, 30 miles. It discharges itself by the Narova into the Gulf of Finland. It is well supplied with fish.

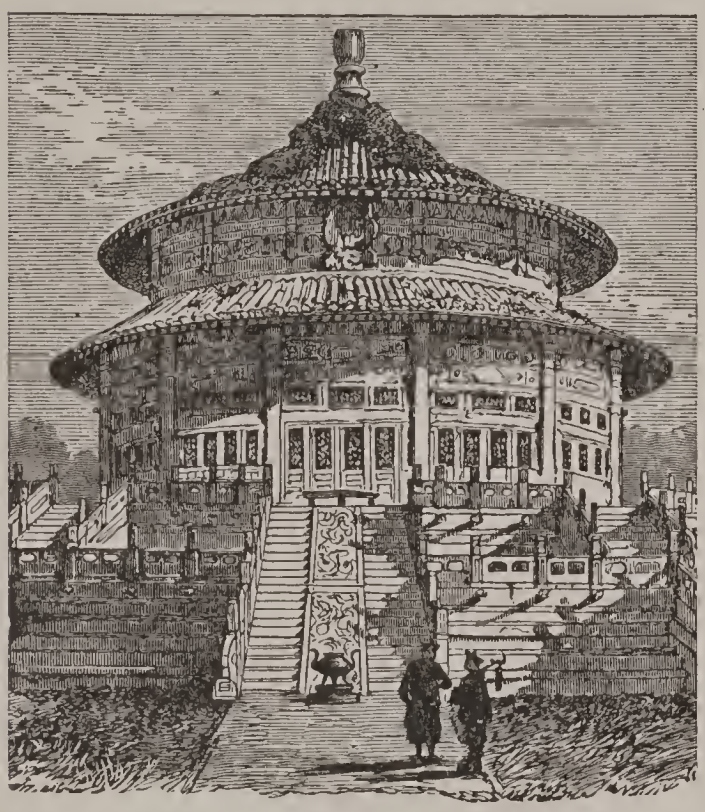
Peishwa, or PESHWA (pesh'wa), the prime-minister and subsequently the head of the Mahratta Empire or Confederacy. See *Mahrattas.*

Pekan (pek'an, pē'kan), a species of marten (*Mustēla pennanti*)

nearly allied to the sable, found in woody regions of North America.

Pekin (pē-kin′), a city, capital of Tazewell county, Illinois, on the Illinois River, 10 miles below Peoria. It has wagon and plow factories, sugar refineries, chemical and malt works, etc. Coal abounds within the city limits. Grain and other products are extensively shipped. Pop. 9897.

Peking (pē-king′), or PEKIN′ ('northern capital' as opposed to Nanking), the capital of the Chinese Empire, is in the province of Chih-le or Pechelee, on an extensive, barren, sandy plain, between the rivers Pei-ho and Hoen-ho, about 40 miles from the Great Wall, and 100 miles from the Gulf of Pechelee. The entire circuit of the walls and suburbs of Peking is reckoned at 30 miles. There are in all sixteen gates leading into the city, each protected by a semicircular enceinte, and a higher tower built in galleries. The city consists of two portions, the north or Tartar city, and the south or Chinese city. The former is built in the shape of a parallelogram, and consists of three inclosures, one within another, each surrounded by its own wall. The innermost inclosure ('the forbidden city') contains the imperial palace, and buildings connected with it, in which the emperor and royal family reside. The second inclosure ('the imperial city') is the residence of the imperial princes and officials of the highest rank. The outer or Tartar city proper is the seat of the six supreme tribunals, and contains the legations of Great Britain, France, the United States and Russia. In the Chinese city broad straight streets run from gate to gate, intersecting each other at right angles, but they are unpaved, and in rainy weather impassable from mud. Among the principal public buildings of Peking are the Temple of Eternal Peace, belonging to the lamas; the Mohammedan mosque; the observatory; the Temple of Agriculture and the Temple of Heaven. In the latter temple the emperor periodically offers sacrifice. It is a vast circular building surmounted by a couple of inverted saucer-shaped roofs, one over the other, and the exterior is brilliantly and harmoniously colored. It occupies a commanding position, and is approached from the different sides by magnificent alabaster stairs. There are religious edifices appropriated to many forms of religion, the principle of toleration being here carried to the utmost extremity — among these are the Greek and Latin churches, Moslem mosques, Buddhist temples, besides temples dedicated to Confucius and other deified mortals. Among the institutions of Peking are the national college, the medical college, astronomical board, and the imperial observatory. Peking is sustained solely by its being the seat of government, having no trade except that which is produced by the wants of its population. Peking is regarded by the Chinese as one of their most ancient cities, but it was not made the capital of the country until its conquest by the Mongols about 1282. In the war of 1860 Peking was occupied by the British and French on October 12, and evacuated by them Nov. 5, after burning the summer palace and inflicting other damage. In 1900 it was the chief seat of the Boxer outbreak and attack on the foreign embassies, and was occupied by the international force sent to the relief of the diplomatic bodies. Considerable damage was done to the imperial city and palace, the court having fled. (See *China, History.*) Within recent years improvements are being made in the streets and means of travel in accordance with European ideas.



Temple of Heaven, Peking.

Pelagianism (pe-lā′ji-an-izm), the system of opinions identified with the name of Pelagius (which see). They included a denial of original sin or the taint of Adam; the maintenance of the doctrine of free-will and the merit of good works, and of the power in man to receive or reject the

gospel. The promulgation of his views by Pelagius was nearly simultaneous with that of the orthodox theory of original sin, etc., by Augustine, and in the development of his doctrine Augustine was influenced by his opposition to Pelagianism. Among the early supporters of Pelagius was Cœlestius, a Roman advocate, who afterwards became a monk; and it was the application of Cœlestius for ordination as a presbyter at Carthage which led to the open conflict between the two schools of thought. His application was denied on the ground of seven heretical opinions, and he was condemned and excommunicated by the Council of Carthage held in 412 A.D. In 417 and 418 A.D. the Council of Carthage repeated its condemnation, and the Emperor Honorius issued a rescript against the Pelagian doctrines. The pope then confirmed the sentence of the councils, and anathematized the Pelagians. In the East, Pelagianism was officially condemned by the Council of Ephesus in 431 A.D. A doctrine subsequently distinguished as *semi-pelagianism* was taught by John Cassian, a monk of Constantinople, ordained a deacon by Chrysostom in 403.

Pelagius (pe-lā′ji-us), the author of the system of doctrine which goes by his name (see above article), was understood by his contemporaries to be of British birth, and the name is supposed to be a Græcized form of the Cymric Morgan (sea-begotten). He was not a monk, but he adhered to monastic discipline, and distinguished himself by his sanctity and purity of life. He came to Rome in the beginning of the 5th century, and is there said to have learned the opinions afterwards identified with his name from a monk Ruffinus, whose teaching was founded on that of Origen. In 410 A.D., during Alaric's third siege of the city, he escaped with his convert and pupil, Cœlestius, to Northern Africa, and had gone from there to Palestine before the meeting of the Council of Carthage (411-12) which condemned Cœlestius. In Palestine he lived unmolested and revered until 415, when Orosius, a Spanish priest, came from Augustine to warn Jerome against him. The result was that he was prosecuted for heresy, but two councils (at Jerusalem, and at Diospolis, the ancient Lydda) pronounced him orthodox. He was subsequently expelled from Jerusalem, however, in consequence of condemnations by the Council of Carthage in 417 and 418 A.D., and by a synod held at Antioch in 421 A.D. Nothing is known of his subsequent career.

Pelamis (pel′a-mis), a genus of venomous sea-snakes, often found swimming in the ocean at great distances from land. It has a length of 2½ feet, and is black above and yellow beneath.

Pel′amys, a genus of fishes, belonging to the *Scombridæ*, or mackerel family. Five species are known.

Pelargonium. See *Geranium*.

Pelasgians (pe-las′ji-anz), a prehistoric race widely spread over the whole of Greece, the coasts and islands of the Ægean, and also in Asia Minor and Italy. Niebuhr regarded them as a great and widely-spread people, inhabiting all the countries from the Po to the Bosphorus, and supplying a common foundation to the Greek and Latin peoples and languages. Other writers, such as Grote, receive the entire tradition of the Pelasgians with almost complete scepticism.

Pelèe (pe-lā′), Mont, a volcano in the island of Martinique, West Indies, which broke into violent eruption with disastrous results, on May 8, 1902, after having been quiescent for half a century. St. Pierre, the principal city of the island, lay at the mountain's foot and its inhabitants, 30,000 in number, were overwhelmed and destroyed by an outflow of hot and smothering gases. The only one that escaped with life was a convict, who lay locked in an underground dungeon.

Peleus (pē′lūs), in Greek mythology, son of Æăcus, king of Ægina. After many adventures he became master of a part of Thessaly, and married the nymph Thetis, by whom he became the father of Achilles. The nuptials were celebrated on Mount Pelion, and honored with the presence of all the gods, who brought rich bridal presents. After his death he received divine honors.

Pelew Islands (pē-lö′), a group belonging to the Caroline Archipelago, in the North Pacific Ocean. They are about twenty in number, extend nearly N. N. E. and S. S. W. 87 miles, and are completely encircled by reefs. They are fertile, and enjoy a good climate. The inhabitants are Polynesians, and have generally got a high character from visitors. Pop. 3160.

Pelias (pē′li-as), a genus of serpents, including the common viper or adder (*P. berus*).

Pelican (pel′i-kan), the name of several web-footed birds of the genus *Pelecānus*. They are larger than the swan, have a great extent of wing, and are excellent swimmers. Pelicans are gregarious, and frequent the neigh-

borhood of rivers, lakes, and the sea-coast, feeding chiefly on fish, which they capture with great adroitness. They have a large flattened bill, the upper mandible terminated by a strong hook, which curves over the tip of the lower one; beneath the lower mandible, which is composed of two flexible, bony branches meeting at the tip, a great pouch of naked skin is appended, capable of holding a considerable number of fish, and thus enabling the bird to dispose of the superfluous quantity which may be taken during fishing expeditions, either for its own consumption or for the nourishment of its young. The species are found in Europe, Asia, Africa, and America. They sometimes perch upon trees; the nest is of rough construction, usually placed close

Pelican (*Pelecānus onocrotālus*).

to the water. The common or white pelican (*P. onocrotălus*) is colored a delicate white, tinged with rose or pink. The young birds are fed by the parents with fishes from the pouch, and the males are said to feed the incubating females in a similar manner. The common pelican inhabits Europe, Asia and Africa. About the middle of September flocks repair to Egypt. During the summer months they take up their abode on the borders of the Black Sea and the shores of Greece. The pelican is not only susceptible of domestication, but may even be trained to fish for its master.

Pelion (pē′li-un), a mountain of Greece, in Thessaly, near the sea, 5300 feet high. In the war of the Titans with the gods the former, say the poets, piled Ossa upon Pelion to aid them in climbing to Olympus.

Pélissier (pā-lēs-yā), Jean Jacques Amable, Duc de Malakoff, Marshal of France, was born in 1794; died in Algeria in 1864. He was educated at the school of St. Cyr, and in 1815 entered the army as sub-lieutenant of artillery, subsequently serving in Spain in 1823, in the Morea in 1828-29, and in Algeria. In this country, being now a colonel, in 1845 he suffocated in a cave a party of Arabs who had taken refuge in it, by lighting a fire at the mouth, an atrocity which brought great odium on his name. In 1855 he replaced Canrobert as commander-in-chief of the French army in the Crimea; and by the vigor

Marshal Pélissier.

with which he pushed the siege he justified the expectations which had been formed of him. On the capture of the Malakoff and the fall of Sebastopol Pélissier received his marshal's baton, and an annual pension of 100,000 francs. He was afterwards vice-president of the senate, a privy-councilor, and ambassador to England (1858). In 1860 he was appointed governor-general of Algeria.

Pella (pel′la), the ancient capital of Macedonia, and the birthplace of Alexander the Great. It surrendered to Paulus Æmilius 168 B.C., and from a large and magnificent city it sank, under the Romans, to a mere station.

Pellagra (pe-lā′gra, pel′a-gra), an endemic disease of comparatively modern origin occurring especially in the plains of North Italy. It begins by an erysipelatous eruption on the skin, which breaks out in the spring, continues till the autumn, and disappears in the winter, chiefly affecting those parts of the surface which are habitually exposed to the sun or air, is accompanied or preceded by remarkable lassitude, melancholy, moroseness, hypochondriasis, and not seldom a strong propensity to suicide. With each year the disorder becomes more aggravated, with shorter intervals

in the winter. At length the surface becomes permanently enveloped in a thick, livid crust, death succeeding this condition. The disease is almost confined to those who reside in the country, leading an agricultural life, and to the lowest orders of society. The general opinion is that the pellagra results from the extreme poverty and low unwholesome diet of the peasantry. It has recently been maintained that the disease is due to the use of spoiled maize in making polenta, the common food of the Italian peasantry. The actual origin of the disease, however, is not yet fully established. It has recently made its appearance in the United States.

Pellew, EDWARD. See *Exmouth.*

Pellico (pel'i-kō), SILVIO, an Italian poet, born in 1788 at Saluzzo, in Piedmont. By his tragedies of *Laodamia* and *Francesca da Rimini* (represented in 1819, with great applause) he earned an honorable place among Italian poets. In the same year, with Manzoni and others, he established the periodical *Il Conciliatore.* In consequence of the liberal spirit displayed in his productions he was in 1820, along with several of his friends, arrested on the charge of belonging to the Carbonari, and in 1822 was condemned to death, but the sentence was commuted to imprisonment in the Austrian prison of the Spielberg for fifteen years. In 1830 he was set at liberty. Pellico has given a most interesting account of his ten years' sufferings in *Le Mie Prigioni* ('My Prisons'), which has been translated into many languages. His constitution, naturally feeble, had been completely shattered. The Marchioness of Barolo offered him an asylum at Turin, and he became her secretary. He died in 1854.

Pellitory (pel'i-tu-ri), or SPANISH CHAMOMILE (*Anacyclus Pyrethrum*), a plant nearly resembling chamomile, of the same order and belonging to an allied genus, a native of the Levant and of Southern Europe. It was introduced into England in 1750, and is chewed to relieve toothache and rheumatism of the gums. A genus of plants (*Parietaria*) of the nettle order is also known as pellitory, or wall-pellitory. The common wall-pellitory (*P. officinālis*) is a herbaceous perennial, with prostrate or erect branched stems, ovate leaves, and small flowers. It contains niter, and was formerly used as a diuretic.

Pelopidas (pe-lop'i-das), in ancient Greek history, a Theban general and statesman, who lived in intimate friendship with Epaminondas. The supremacy of the Spartan faction in Thebes forced Pelopidas, with other exiles, to take refuge in Athens, but he returned in B.C. 379, and succeeded in overthrowing the Spartan party and recovering the citadel of Thebes. In the war with Sparta which followed Pelopidas distinguished himself in the battles of Tegyra (375) and of Leuctra (371), by which Thebes became for a time the leading power of Greece. In 364 he was sent against Alexander of Pheræ, tyrant of Thessaly, whom he defeated in the battle of Cynoscephalæ, though he himself was slain.

Peloponnesus (pel-ō-pon-nē'sus; Gr. 'island of Pelops'), the peninsula which comprehends the most southern part of Greece, now called the Morea. Peloponnesus was anciently divided into six states: Messenia, Laconia (Sparta), Elis, Arcadia, Achaia, and Argolis, to which some add Sicyon. See *Greece* and articles on the different states.

Pelops (pē'lops), in Greek mythology, son of Tantalus, king of Lydia. He married Hippodamia, a daughter of King Œnomaus of Elis, and succeeded his father-in-law in that kingdom. Peloponnesus received its name from him. Of his sons, Atreus and Thyestes are most celebrated. Many and very different myths are connected with his name.

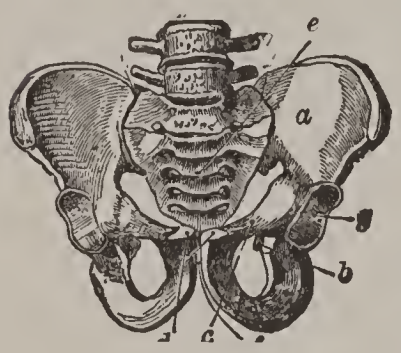
Peloria (pe-lō'ri-a; Gr. *pelōr*, a monster), in botany, the appearance of regularity of structure in the flowers of plants which normally bear irregular flowers, instances of which occur in the snapdragon and the toadflax, which, being normally irregular, assume a symmetrical form.

Peltier (pel-te-ā), JEAN CHARLES ATHANASE, French physicist; born in 1785; died in 1845. He was the author of numerous papers in different departments of physics, but his name is specially associated with the thermal effects at junctions in a voltaic circuit.

Pelusium (pē-lū'shi-um; the 'Sin' of the Scriptures), a city of ancient Egypt, situated on the eastern arm of the Nile delta, about 2½ miles from the sea, near the modern Damietta.

Pelvis (pel'vis; Latin, *pelvis*, a basin), the bony basin formed by the 'haunch-bones' and sacrum of Vertebrata, which constitutes the girdle or arch giving support to the lower or hinder limbs. The pelvis thus corresponds to the shoulder-girdle of the upper or fore limbs; and forms a cavity or basin in which several of the abdominal viscera, and organs relating to reproduction and the urinary functions, are protected and

contained. The pelvis consists of four bones, the front and sides being formed by the two *ossa innominata* or innominate bones, and the circle being completed behind by the *sacrum* and the *coccyx*. Each innominate bone consists in early life of three pieces termed *ilium*, *ischium*, and *pubis*, and they meet in front at the *symphysis pubis*. The pelvis of man differs materially from that of woman, the differences having chiefly reference to the greater capacity required for the womb during pregnancy, and for the expulsion of the child at birth. It also varies somewhat in the different races of men.



Pelvis.

a, Ilium; *b*, ischium; *c*, pubis; *d*, symphysis pubis; *e*, sacrum; *f*, coccyx; g, acetabulum or cavity for head of thigh-bone.

Pemberton (pem'bėr-tun), a town of England, Lancashire, 2½ miles w. of Wigan, with collieries, cotton-mills, chemical works, etc. Pop. (1911) 35,640.

Pembrey (pem'bri), a seaport of South Wales, in Carmarthenshire, on the Burry Inlet, 5 miles w. of Llanelly. It has tin and copper works, and ships considerable quantities of coal. Pop. (1911) 12,183.

Pembroke (pem'brōk), a seaport of South Wales, capital of the county of the same name, on a creek on the southern side of Milford Haven, 206 miles west of London. On the west side are the picturesque ruins of an ancient castle or fortress erected in 1092, the remains of which give evidence of its former magnificence. On the northwest side is Pembroke Dock, otherwise called Pater, a small village until 1814, when the royal dockyard for the construction of ships of war was removed thither from Milford Haven. The town has now but little trade beyond that connected with the government dockyard, which comprises an area of about 80 acres, and is strongly fortified. Pop. (1911) 15,673.—The COUNTY is bounded by the Cardiganshire, Carmarthenshire, the Bristol Channel, and St. George's Channel; area, 628 sq. miles. Its coast-line is deeply indented, and in the south is the magnificent harbor of Milford Haven. The surface is generally undulating, and greatly diversified with hills and dales. Lead, iron, slate, and coal are worked. The climate is humid and very mild. Chief towns: Haverfordwest, Pembroke and Tenby. Pop. 89,956.

Pembroke, a town, capital of Renfrew Co., on Allumette Lake, Ontario, Canada. It has axe, woolen and other works. Pop. (1911) 5626.

Pemmican (pem'i-kan), originally a North American Indian preparation consisting of the lean portions of venison dried by the sun or wind, and then pounded into a paste and tightly pressed into cakes. Pemmican made of beef is frequently used by travelers.

Pen, an instrument for writing with a fluid. Pens of some sort have been in use from very early times, adapted to the material on which the characters were to be inscribed. The metallic stilus for the production of incised letters was probably the earliest writing implement. It was used by the Romans for writing on tablets coated with wax; but both they and the Greeks also used what is the true ancient representative of the modern pen, namely, a hollow reed, as is yet common in Eastern countries. It has been asserted that quills were used for writing as early as the fifth century A.D. In Europe they were long the only writing implement, the sorts generally used being those of the goose and swan. Up till the end of the first quarter of the 19th century these formed the principal materials from which pens were made. In 1803 Mr. Wise produced steel pens of a barrel form, mounted in a bone case for carrying in the pocket. They were of indifferent make, and being expensive (costing half-a-crown each originally, though the price was subsequently reduced to sixpence), were very little used. Joseph Gillott commenced the manufacture about 1820, and succeeded in making the pen of thinner and more elastic steel, giving it a higher temper and finish. Mr. Gillott was followed into the same field by Mr. Perry and others, and their improvements have so reduced the cost and raised the quality, that a gross of better pens are now sold by the same makers at one-sixth of the price of a single pen in 1821. Cast-steel of the finest quality is used in the manufacture, and the various operations are performed by cutting, stamping, and embossing apparatus worked mostly by hand-fly presses. Birmingham was the first home and is still the principal center of the steel-pen industry, though the manufacture has spread to the United States and other countries. Gold pens tipped

with minute particles of iridium are now in somewhat extensive use, and a good one will last for years. Fountain pens and penholders, to carry a considerable supply of ink and to discharge it in an equal manner, were invented by Joseph Bramah and have been frequently and greatly improved upon. They are now in somewhat common use. Gold pens are usually employed in them.

Penance (pen'ans), in theology, a punishment accepted or self-imposed by way of satisfaction and in token of sorrow for sin. In the early Christian church penances were of three kinds — secret, public, and solemn. The first consisted of such actions as are commonly imposed by confessors at the present day, as the repetition of certain prayers, etc. Public penance was in use from the earliest days of the church. It was often very severe, and the penitents had to make a public confession of their sins in the church. It became gradually the custom of the bishops to commute the canonical penances for pious works, such as pilgrimages, alms-deeds, and other works of charity; and these again were exchanged for indulgences. In the Roman Catholic Church penance is one of the seven sacraments. The matter of it consists of the three acts of the penitent: 1. Contrition, or heartfelt sorrow for sin as being an offense against God; 2. Confession to an authorized priest, and 3. Satisfaction, or the acceptance and performance of certain penitential works in atonement of the sin; and the form of the sacrament is the sentence of absolution from sin pronounced by the priest who received the confession, and has been satisfied of the earnest repentance of the sinner. According to the doctrine of the Protestants there is no such sacrament; they consider repentance and faith as the only requisites for forgiveness.

Penang (pē-nang'), PULO-PENANG, or PRINCE OF WALES ISLAND, an island belonging to Great Britain, lying at the north entrance of the Straits of Malacca, off the west coast of the Malay Peninsula, from which it is separated by a channel 2 to 5 miles across; area, 107 sq. miles. Two-fifths of Penang is plain, and the rest hills — for the most part wooded — which rise to a height of 2734 feet in the peak now used as a sanatorium. The climate is hot, but very healthy. The scenery is charming. The island produces cocoa-nuts and areca-nuts, nutmegs and cloves, rice, sugar, coffee, and pepper. George Town, or Penang (pop. about 50,000), the capital and port of the settlement, is a handsome town, rapidly increasing in size, and has a large commerce. The harbor is the strait between island and mainland. Penang was made over by treaty to the East India Company in 1786 by the Rajah of Quedah, and with Province Wellesley, a long strip of the Malay Peninsula opposite (area, 270 square miles), it now forms one of the Straits Settlements, having a resident councilor to control administration. Pop. of the settlement 248,207.

Penarth (pen-ärth'), a seaport of South Wales, in Glamorgan, at the mouth of the river Taff, 3 miles south of Cardiff. Penarth was an obscure village until the formation of its docks (1865-84), which have made it an important shipping port for the minerals of South Wales. It is frequented in summer as a bathing-place and seaside resort. Pop. (1911) 15,488.

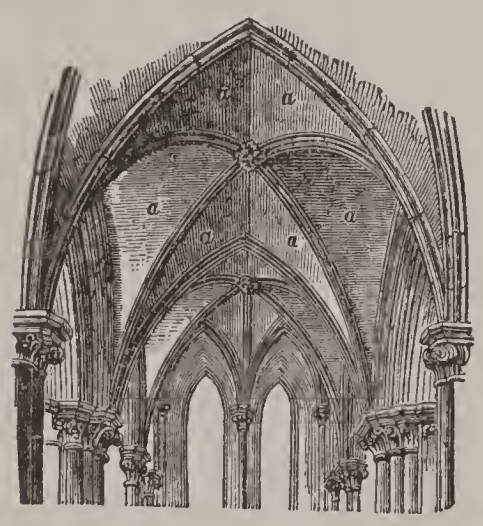
Penates (pe-nā'tēz), the private or public gods of the Romans. The images of these gods were kept in the penetralia, or central part of every house, each family having its own Penates and the state its public Penates. The Lares were included among the Penates, but were not the only Penates; for each family had generally but one Lar, whereas the Penates are usually spoken of in the plural. Their worship was closely connected with that of Vesta.

Pencil (pen'sil), an instrument used for painting, drawing, and writing. The first pencils used by artists were probably pieces of colored earth or chalk cut into a form convenient for holding in the hand. On the introduction of moist colors, however, delicate brushes of fine hairs were used. Pencils of this kind, and of various degrees of fineness, are now almost solely used by painters for laying on their colors; and in China and Japan they are generally employed, instead of pens, for writing. The hairs used for these pencils are obtained from the camel, badger, squirrel, sable, goat, etc. The hairs, being selected, are bound in a little roll by a string tied tightly round their root ends. The roll is then fixed into the end of a quill tube. For larger pencils a socket of tin-plate is used instead of the quill. Black-lead pencils, for writing or drawing, are made of slips of graphite or plumbago (otherwise known as black-lead), generally cased in cedar wood. Blocks of graphite are rarely found of such size and purity that they can be sawed up into the small square slices of ordinary pencil length; but a method has been devised of purifying the inferior varieties, which are ground to a fine powder, levigated or

washed until pure, intimately mixed with clay in various proportions, and afterwards solidified by pressure. The comparative hardness and blackness of pencils are attained by the degree of heat to which they are subjected and the proportions of graphite and clay in the leads. Nuremberg is the great center of the lead-pencil trade. Colored pencils are prepared from various chalks, such as are used for crayons, instead of the graphite. Pencils for writing on slate are made by cutting slate into small square pieces and rounding them, or into narrow slips and incasing them in wood.

Pendant, in architecture, is a hanging ornament used in the vaults and timber roofs of Gothic buildings, more particularly in late Gothic work. In vaulted roofs pendants are of stone, and generally richly carved; in timber roofs they are of wood variously decorated. Fine examples of stone pendants are to be seen in the chapel of Henry VII at Westminster Abbey. See *Pennant.*

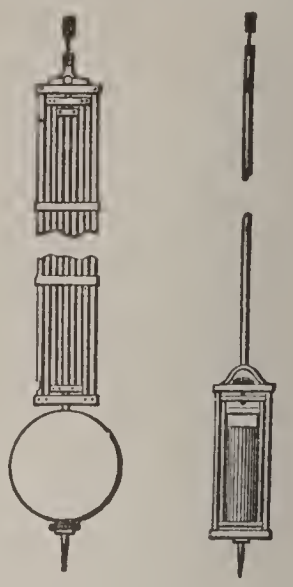
Pendentive (pen-den'tiv), in architecture, the portion of a dome-shaped vault which descends into a corner of a quadrangular opening when a ceiling of this kind is placed over



Pendentive Roof, Salisbury Cathedral.
a a a, Pendentives.

a straight-sided area; in Gothic architecture, the portion of a groined ceiling springing from one pillar or impost, and bounded by the ridges or apices of the longitudinal and transverse vaults.

Pendulum (pen'dū-lum), in the widest sense, a heavy body suspended so that it is free to turn or swing upon an axis which does not pass through its center of gravity. Its only position of stable equilibrium is that in which its center of gravity is in the same vertical plane with the axis. If the body is displaced from its position it will tend to return to it, and it will oscillate or swing from one side of that position to the other until its energy is destroyed by friction, and it at length comes to rest. A small, heavy body suspended from a fixed point by a string, and caused to vibrate without much friction, is called a 'simple pendulum.' When the swings of a simple pendulum are not too great — that is, when they are never more than about 3° on each side of the position of rest — the pendulum is isochronous, that is, each swing occupies the same time, and its period is true to the law —



Gridiron Pendulum. Mercurial Pendulum.

$$T=2\pi\sqrt{\frac{l}{g}};$$

where T is the period of a complete vibration, π is the well-known mathematical number 3.1416, l the length of the pendulum in feet, and g the acceleration due to gravity, or 32.19 feet per second at London. The 'seconds' pendulum has for its time of vibration (half its complete period) one second. In the above equation, putting for T two seconds, and for g 32.19, we find the length of the seconds pendulum at London to be 3.26 feet, or 39.1398 inches. A true simple pendulum is a mathematical abstraction: a heavy particle, an inextensible and inflexible weightless string, and no friction; these conditions are only approximated to in nature. The ordinary pendulum is what is properly a 'compound pendulum.' A compound pendulum, as seen in clocks, is usually a rigid, heavy, pendulous body, varying in size according to the size of the clock, but the 'seconds' pendulum may be considered the standard. The pendulum is connected with the clockwork by means of the escapement, and is what renders the going of the clock uniform. (See *Clock.*) In a clock it is necessary that the period of vibration of the pendulum should be constant. As all substances expand and contract with heat and cold, the distance from the center of suspension to the center of gravity of a pendulum is continually altering. Pendulums constructed so that increase or dim-

inution of temperature do not affect this ratio are called compensation pendulums. These take particular names, according to their forms and materials, as the *gridiron pendulum*, the *mercurial pendulum*, etc. The former is composed of a number of rods so connected that the expansion or contraction of certain of them is counteracted by that of the others. The *mercurial pendulum* consists of one rod with a vessel containing mercury at the lower end, so adjusted in quantity that whatever alterations take place in the length of the pendulum, the center of oscillation remains the same, the mercury ascending when the rod descends, and *vice versâ*.

Penedo (pā-nā′dụ), a town of Brazil, in the province of Alagoas, near the mouth of the San Francisco River. Pop. about 12,000.

Penelope (pen-el′u-pē), in Greek mythology, the wife of Odysseus (Ulysses) and mother of Telemachus, who was but an infant when his father sailed against Troy. During the protracted absence of Odysseus, Penelope was surrounded by a host of suitors, whom she put off on the pretext that before she could make up her mind she must first finish a large robe which she was weaving for her father-in-law, Laërtes. To gain time she undid by night the work she had done by day. Her stratagem was at last communicated to the suitors by her servants, and her position became more difficult than before; but fortunately Odysseus returned in time to protect his spouse, and slay the obnoxious wooers, who had been living in riot and wasting his property.

Penelope, a genus of gallinaceous birds. See *Guan*.

Penguin (pen′gwin), a family of natatorial or swimming birds adapted for living almost entirely in the water. They possess only rudimentary wings, destitute of quill-feathers, and covered with a scaly integument or skin. Although useless as organs of flight, the wings are very effective aids in diving, and on land they may be used after the fashion of fore-limbs. The legs are placed at the hinder extremity of the body, and the birds assume an erect attitude when on land. The toes are completely webbed. They inhabit chiefly the high southern latitudes, congregating sometimes in colonies of from 30,000 to 40,000. There are three different types of penguins, represented by the king penguin, the jackass penguin, and the rockhopper, constituting respectively the generic groups *Aptenodȳtes*, *Spheniscus*, and *Catarractes*. The jackass penguin and the rockhopper are about 2 ft. 3 in. in height, and the king penguin some-

King Penguin (*Aptenodȳtes patagonica*).

what larger; but a fossil penguin of the upper Eocene stood from 6 to 7 feet high.

Penicillium (pen-i-sil′i-um), a genus of fungous plants found on decaying bodies and in fluids in a state of acetification. *P. glaucum* is the ultimate state both of the vinegar-plant and the yeast-plant, called in its first stage *Torula cerevisiæ*.

Peninsula (pen-in′sū-la; L. *pene*, almost, and *insula*, an island), a portion of land almost surrounded by water, and connected with the mainland by a narrow neck or isthmus. The term 'The Peninsula' is frequently applied to Spain and Portugal conjointly.

Peninsular War, The, was caused by the intrigues and ambition of Napoleon, who proposed the partition of Portugal (1807), and placed his brother Joseph upon the throne of Spain. For a time the whole peninsula was occupied by French troops, but the Spanish and Portuguese peoples rose in defense of their liberties, and waged a fierce guerrilla warfare against the invaders. Britain joined the patriots in 1808. Of the memorable struggle which ensued, the main features were the retreat of Sir John Moore to Coruña, and his glorious death there; the accession of Sir Arthur Wellesley (afterwards Duke of Wellington) to the supreme command; his formation of the celebrated lines of Torres Vedras, where he held the French armies in check until he had accomplished the complete liberation of Portugal; and his subsequent victorious march through Spain, marked by the great battles of Salamanca (1812) and Vittoria (1813). In the spring of 1814 the tide of war rolled through the passes of the Pyre-

nees into the south of France, where this great struggle was concluded by the crowning victory of Toulouse.

Penistone (pen′is-ton), a town of Yorkshire, England, 12 miles N.W. of Sheffield, with steel and other industries. Pop. (1911) 7408.

Penitential Psalms (pen-i-ten′-shal), the seven psalms vi, xxxii, xxxviii, li, cii, cxxx, cxliii of the Authorized Version, so termed as being specially expressive of contrition. Reference is made to them by Origen. They have a special place in the breviary of the Roman Church. The psalm most frequently repeated as being the most penitential is the Miserere, the li. of the Authorized Version.

Penitentiary (pen-i-ten′sha-ri), a prison in which convicted offenders are confined and subjected to a course of discipline and instruction with a view to their reformation. The two systems of penitentiaries in the United States are known as the Pennsylvania, or solitary confinement system, and the New York, or aggregate labor system.

Penitentiary, at the court of Rome, an office in which are examined and delivered out the secret bulls, graces, or dispensations relating to cases of conscience, confession, etc.; also an officer in some Roman Catholic cathedrals, vested with power from the bishop to absolve in cases referred to him. The pope has a grand penitentiary, who is a cardinal and is chief of the other penitentiaries.

Penn, WILLIAM, the founder of the State of Pennsylvania, was born in London in 1644. He was the only son of Admiral Sir William Penn. In his fifteenth year he was entered as a gentleman commoner of Christ Church, Oxford, where he imbibed the views of the Society of Friends and was expelled from the university. His father sent him on travels in France and Holland, and in 1666 committed to him the management of a considerable estate in Ireland. At Cork he was committed to prison for attending Quaker meetings, and although he was very soon liberated, he had to leave Ireland. In 1668 Penn appeared as a preacher and an author, and on account of an essay, entitled *The Sandy Foundation Shaken*, he was imprisoned in the Tower, where he remained seven months. During this time he wrote his most celebrated work, *No Cross, no Crown, and Innocency with Her Open Face.* In 1670 Sir William died, fully reconciled to his son, to whom he left his estates and all his property. This same year meetings of Dissenters were forbidden, under severe penalties. The Quakers, however, continued to meet as usual, and Penn was once more put into prison for six months. The persecutions of Dissenters continuing to rage, Penn turned his thoughts towards the New World. From his father he had inherited a claim upon the government of £16,000, and in settlement of this claim King Charles II, in 1681, granted him large territories on the west side of the Delaware River, the present State of Pennsylvania, with right to found a colony or society with such laws and institutions as expressed his views and principles. The following year Penn went over to America and laid the foundations of his colony on a democratical basis, and with a greater degree of religious liberty than had at that time been allowed in the world. The city of Philadelphia was laid out upon the banks of the Delaware, and the colony soon came into a flourishing condition, its settlers including not only Friends, or Quakers, but immigrants of different denominations and countries. He remained in the province about two years, adjusting its concerns, and establishing a friendly intercourse with his colonial neighbors. Soon after Penn returned to England King Charles died (1685), and the respect which James II bore to the late admiral, who had recommended his son to his favor, procured to him free access at court. He made use of this advantage to solicit the discharge of his persecuted brethren, 1500 of whom remained in prison at the decease of the late king; and his influence is thought to have hastened, if it did not occasion, the proclamation for a general pardon, and the repeal of religious tests and penalties. After the Revolution of 1668 Penn's former intimacy with the abdicated monarch created suspicions, in consequence of which he was accused of treason, but no evidence was found against him. In 1699 he again sailed for Pennsylvania, intending to make it the place of his future residence; but he returned to England again in 1701. He died at Ruscombe, Berks, July 30, 1718.

Pennant, or PENDANT, a long, narrow banner displayed from the mast-head of a ship-of-war, usually terminating in two ends or points, called the *swallow's tail.* It denotes that the vessel is in actual service.

Pennant (pen′ant), BASEBALL, is the trophy contended for by the clubs in the various baseball leagues. It is of silk and is purchased out of the league's funds and presented to the club

winning the most games of the season in that league.

Pennant, Thomas, an English naturalist and antiquary, born at Downing, in Flintshire, in 1726. He early devoted himself to natural history and archæology. In 1761 he published the first part of his *British Zoölogy*, which gained him considerable reputation both in Britain and on the Continent. In 1765 he made a journey to the Continent, where he visited Buffon, Haller, Pallas, and other eminent foreigners. He was admitted into the Royal Society in 1767, and in 1769 he undertook his first tour into Scotland, where he met with a flattering reception. After a busy life of literary labor and research he took leave of the public in 1793 in an amusing piece of autobiography — *The Literary Life of the late Thomas Pennant.* He died in 1798.

Pennatula (pen-at'ū-la), a genus of Cœlenterate animals (popularly known by the name of 'sea-pens' or 'cocks'-combs'); belonging to the class Actinozoa, order Alcyonaria. The sea-pens consist each of a compound organism, which may be described as consisting of a main stem or *cœnosarc*, with lateral pinnæ or branches. These branches are crowded on their upper margins with the little polyps or individual animals that make up the compound mass, and which are connected together through the fleshy medium or cœnosarc. The lower end of the stem is fleshy, destitute of polyps, and contains an internal coral-rod. By this fleshy root the sea-pens attach themselves loosely to the mud of the sea-bed. The British species (*P. phosphorĕa*), averaging about 3 or 4 inches in length, derives its scientific name from its property of emitting a phosphorescent light.

Pennatula (*P. rubra*).

Pennell (pen'el), Joseph, American etcher, illustrator and author, born in Philadelphia in 1860. In 1884 he married Elizabeth Robins, who has been his literary collaborator in the preparation of numerous illustrated books of travel and description.

Pennon (pen'un), a small triangular flag carried by the knights of the middle ages near the points of their lances, bearing their personal devices or badges, and sometimes richly fringed with gold.

Pennsylvania (pen-sil-vā'ni-a), one of the North Atlantic States of the American Union, bounded N. by New York and Lake Erie, E. by New York and New Jersey, S. by Delaware, Maryland, and West Virginia, and W. by West Virginia and Ohio; area 45,126 sq. miles. Except on the east, where the river Delaware forms an irregular boundary line, its sides form an almost exact parallelogram facing the cardinal points. The surface is traversed southwest to northeast by the Allegheny mountain chain, and covered by many smaller ranges, which are more or less parallel to it. These include the Blue Ridge, or South Mountain, on the east, the Allegheny ridges on the west, and various intermediate ones, while between them lie the large and fertile Cumberland, Lebanon, and Wyoming valleys. On the east side the Alleghenies are rugged and steep, but on the west descend very gradually, and then stretch out into an extensive table-land. The principal rivers are the Delaware, which receives the Lehigh and the Schuylkill; the Susquehanna, with its main tributary, the Juniata; and the Allegheny, which unites at Pittsburgh with the Monongahela to form the Ohio. Pennsylvania is one of the healthiest states of the Union. The soil has various grades of fertility, but is in general well adapted for agricultural operations. The richest and most highly cultivated tract is southeast of the mountains on both banks of the Susquehanna, including the Lancaster and Chester valley regions; also the valleys of the Ohio and its tributaries. The most important crops consist of oats, corn, wheat, rye, buckwheat, and potatoes, while tobacco is abundantly raised in the Lancaster valley region. Dairy and market garden products are also large and valuable. Nearly one-fourth of the state is covered by woodland and the lumber interests are extensive. In mineral wealth Pennsylvania has long ranked high, especially in coal, iron, and petroleum. In the mountain districts of the north and east to the west of the Susquehanna an anthracite coal-field of unrivaled value occurs over an area estimated at 472 square miles; while to the west of the Alleghenies a vast bituminous coal-field, of which Pittsburgh may be considered the center, has been traced over an area of 12,300 square miles.

The coal strata of both these fields contain many valuable seams of ironstone, and both the smelting and working of iron have long been regarded as the most important interest of the state. An accession of immense value was the discovery of petroleum in 1859. While its iron and petroleum product has fallen off as compared with some other states, that of coal still stands preëminent, the state producing about half the coal of the entire country. Other mineral products are salt, obtained from brine wells, nickel, zinc, lime, slate, etc. There are a number of noted mineral springs. In the amount of its manufactures the state is second only to New York. The city of Philadelphia is one of the world's great manufacturing centers, Pittsburgh is unsurpassed in the country for its iron and glass interests, and several other cities are prominent in iron and steel products. In machine-shop products Pennsylvania takes first rank, as also in textile and carpet manufactures and shipyard products. Its trade is also large, both foreign and inland. In railroad facilities it stands third, with 11,150 miles, being surpassed only by Texas and Illinois. Its canals, formerly over 1000 miles in length, have been largely abandoned in consequence of railroad rivalry. Education is well advanced, the higher institutions of learning including the University of Pennsylvania, the Western institution of the same title, Lafayette College, Lehigh University, and various other prominent institutions. The first settlement in the state was made by a company of Swedish emigrants in 1638. The Dutch afterwards gained possession, but it was wrested from them by the English in 1664. A subsequent settlement was made in 1682 by William Penn, from whom the state has derived its name. It is the second state in respect of population. Capital, Harrisburg. Pop. 7,665,111.

Pennsylvania Dutch, a German dialect mixed with English, spoken in Pennsylvania by German settlers and their descendants.

Penny (pen'i), a British coin (formerly of copper, since 1860 of bronze) and money of account, the twelfth part of a shilling, closely equal in value to two cents of the American currency. It was at first a silver coin weighing about 22½ grains troy, or the two-hundred-and-fortieth part of a Saxon pound. Till the time of Edward I it was so deeply indented by a cross mark that it could be broken in halves (thence called half-penny) or quarters (fourthings or farthings). Its weight was steadily decreased till at last, in the reign of Elizabeth, it was fixed at 7 $\frac{2}{3}\frac{3}{1}$ grains, or the sixty-second part of an ounce of silver. Copper pennies were first coined in 1797, but copper half-pennies and farthings had been in use from 1672. The old Scots penny was only $\frac{1}{1\,2}$ *d.* sterling in value, the pound being equal to 20*d.* sterling.

Pennyroyal (pen'i-roi-al), a species of mint (*Mentha Pulegium*) formerly in considerable repute as a medicine, but now almost totally neglected. See *Mint.*

Pennyweight (pen'i-wāt), a troy weight containing 24 grains, each grain being equal in weight to a grain of wheat from the middle of the ear, well dried. It was anciently the weight of a silver penny, hence the name.

Penobscot (pē-nob'skot), the largest river of Maine. It flows 300 miles south by west to Penobscot Bay. It is navigable for ships to Bangor, a distance of 60 miles, where the tide rises to a height of 17 feet.

Penrhyn Islands (pen'rin), a group in the Pacific Ocean, lat. 9° 2′ s.; lon. 157° 35′ w. They are densely wooded and populous. The British flag was hoisted on the Penrhyn Islands in 1888.

Penrith (pen'rith), a market-town of England, in the county of Cumberland, 17 miles south by east of Carlisle. It has a grammar-school founded in 1340, is well built, and is a prosperous place, its market being the center of a large agricultural trade. Pop. (1911) 8612.

Penryn (pen'rin), an ancient municipal and parliamentary borough, market-town, and seaport of England, in the county of Cornwall, 2 miles northwest of Falmouth, at the head of a branch of Falmouth harbor. The port is included in that of Falmouth. Pop. 3190.

Pensacola (pen-sa-kō'la), a port of entry and capital of Escambia county, Florida, on Pensacola Bay, about 10 miles from the Gulf of Mexico, and 50 miles (direct) S.E. of Mobile. It has a deep harbor and the bay is one of the safest and most capacious in the Gulf of Mexico. It has been selected as a naval station and depot, the navy yard being at Warrington, 7 miles to seaward of the town. The entrance to the harbor is defended by several strong forts. There are here large grain elevators, and the place has an extensive shipping trade in lumber, fish,

PENNSYLVANIA

Scale of Miles
0 5 10 20 30 40 50

A 80° B 79° C 78° D 77° E 76° F 75°

1 2 3 4 41° 42°

Longitude West from Greenwich

hides, wool, cotton, and naval stores. Pop. 22,982.

Pensionary (pen'shun-a-ri), one of the chief magistrates of towns in Holland. The *Grand Pensionary* was the first minister of the United Provinces of Holland under the old republican government.

Pensions (pen'shunz), annual allowances of money settled upon persons, usually for services previously rendered. In Britain civil pensions are conferred on certain ministers of state, etc., on retirement after a number of years' service, with smaller sums called the civil list pensions. These latter pensions are assigned to those who, by their personal services to the crown, by the performance of duties to the public, or by their useful discoveries in science and attainments in literature and the arts, have merited the gratitude of their country. In addition, army and navy pensions are paid to veterans of those incapacitated for service by wounds, etc. By a law which became effective January 1, 1909, a system of old-age pensions was established in Britain. A similar system had existed in Germany for many years, and like ones have been established to a partial extent in some other countries. In the United States the pension system differs from that of most other countries; pensions, with few exceptions, are granted only on account of military service; having no large standing army, its pensions are given chiefly to volunteers and drafted men. Since the Civil war the pension system has developed from a very small establishment to a great bureau. The appropriations made by Congress have increased yearly. In 1861 there was disbursed on account of pensions $1,072,461. There were 993,529 pensioners on the rolls June 30, 1900, including 751,864 invalids and 241,674 widows, etc., the disbursement for pensions amounting to $139,381,522. Though the Civil war pensioners were then dying rapidly, the Spanish war added to the number, which reached its highest point, 999,545, in 1902. By 1911 the number had declined to 892,098, a general service pension having added largely to the total, while an increase in rates added to the sum paid, which reached $159,974,056, a total surpassed only in 1909. In 1908 two daughters of Revolutionary soldiers were still on the rolls, Sarah C. Hurlbutt, aged 90, and Phebe M. Wooley, aged 87, the last named still surviving in 1910. The last survivor of the Revolution, Daniel F. Bakeman, died in 1869, aged 109 years; the last survivor of the war of 1812 in 1905, aged 105. While the system of old age pensions has not been introduced into the United States as a government institution, it has been established in some of the states and cities, for teachers, policemen, and firemen, and by a number of railroad and other corporations. The government is considering a general service pension system.

Pentagon (pen'ta-gon), a figure of five sides and five angles; if the sides and angles be equal it is a regular pentagon; otherwise, irregular.

Pentagraph. See *Pantograph.*

Pentamera (pen-tam'ė-ra), one of the primary sections into which coleopterous insects (beetles) are divided, including those which have five joints on the tarsus of each leg.

Pentamerone (pen-ta-mē-rō'nā), a famous collection of fifty folk-tales (Naples, 1637), written by Giambattista Basile in the Neapolitan dialect. They are claimed to be told during five days by ten old women for the entertainment of a Moorish slave, who has usurped the place of the rightful princess. They have been translated into German and English, a complete English translation being published by Sir Richard Burton in 1893. These tales are of great value to the student of folk-lore.

Pentameter (pen-tam'e-tėr), in prosody, a verse consisting of five feet. It belongs more especially to Greek and Latin poetry. The first two feet may be either dactyls or spondees, the third is always a spondee, and the last two anapests. A pentameter verse, subjoined to a hexameter, constitutes what is called the elegiac measure.

Pentateuch (pen'ta-tūk), the Greek name applied to the first

five books in the Bible, called also the Law of Moses (Hebrew, *Torah Moshch*), or simply the Law (*Torah*). The division of the whole work into five parts has by some authorities been supposed to be original; others, with more probability, think it was so divided by the Greek translators, the titles of the several books being Greek, not Hebrew. It begins with an account of creation and the primeval condition of man; of the entrance of sin into the world, and God's dealing with it, broadening out into a history of the early world, but again narrowing into biographies of the founders of the Jewish family; it then proceeds to describe how the family grew into a nation in Egypt, tells us of its oppression and deliverance; of its forty years' wandering in the wilderness; of the giving of the law, with all its civil and religious enactments; of the construction of the tabernacle; of the census of the people; of the rights and duties of the priesthood; and concludes with the last discourses of Moses and his death. The Pentateuch and the book of Joshua are sometimes spoken of together as the *Hexatcuch;* when Judges and Ruth are added, as the *Octatcuch.*

Until nearly the end of the 18th century the conviction that Moses wrote the complete work, with the exception of the last chapter or so of Deuteronomy, ascribed to Joshua, might be said to have been universally adhered to; but previously to this the question whether the Pentateuch was the work of one man or of one age, and what share Moses had in its composition, had been discussed seriously and with more or less critical investigation. Spinoza, in a work published in 1679, maintained that we owe the present form of the work to Ezra. A scientific basis was given to the investigation by Jean Astruc (1753), who recognized two main documentary sources in Genesis, one of which used the name *Elohim* and the other *Jehovah* for God. This 'documentary theory' gave way to the 'fragmentary theory' of Vater (1815) and Hartmann (1818), who maintained that the Pentateuch was merely a collection of fragments thrown together without order or design. This theory has now lost its popularity by the substitution of another, called the 'supplementary hypothesis,' whose leading principle is that there was only one original or fundamental document (the Elohistic) giving a connected history from first to last, such as we have in the Pentateuch; but that a later editor (the Jehovist), or several successive editors, enlarged it to its present extent, sometimes very greatly, by the insertion of additional matter from other sources, whether these had appeared in a written form already, or whether they were still floating in the minds of the people as traditions. The book of Joshua is now generally regarded as in its character belonging to and completing the Pentateuch. De Wette was the first to concern himself (early in the last century) with the historical apart from the literary criticism of the Pentateuch, and refused to find anything in it but legend and poetry. The discussions on these points, which until recently were mainly led by German theologians, have latterly been taken up by English biblical critics, among the earliest being Dr. Davidson and Bishop Colenso.

Among those critics of the present day who deny the Mosaic authorship of the Pentateuch there is a tendency to recognize three elements or component parts welded together in the whole work (including Joshua). One of these is the fundamental or Elohistic document, which is partly historic in its matter but mainly legal, embracing Leviticus and parts of Exodus and Numbers. Another element consists of the Jehovistic, which is almost entirely narrative and historical, and to which belongs the history of the patriarchs, etc. The third component element is Deuteronomy, the second giving of the law, as the name signifies. The respective antiquity of the several portions has been much disputed, many critics making the Elohistic the earliest, the Jehovistic second, Deuteronomy last. Some modern critics, however, put the Elohistic section last, believing it to have been drawn up during the exile and published by Ezra after the return; while the Jehovistic section is assigned to the age of the early kings, and Deuteronomy to the reign of Josiah.

Pentecost (pen'te-kost: from the Greek *pentēkostē*, the fiftieth), a Jewish festival, held on the fiftieth day after the passover, in celebration of the ingathering and in thanksgiving for the harvest. It was also called the *Feast of Weeks*, because it was celebrated seven weeks after the passover. It is also a festival of the Christian church, occurring fifty days after Easter, in commemoration of the descent of the Holy Ghost on the disciples, called in England *Whitsuntide.*

Penthesilea (pen-the-sil-ē'a), in Greek mythology, a queen of the Amazons (which see).

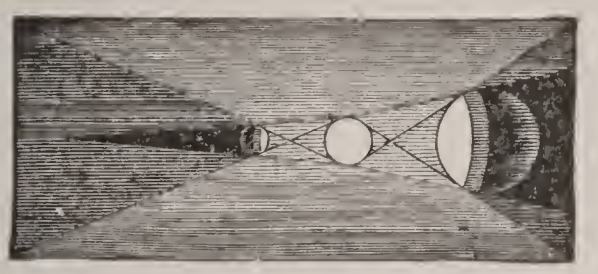
Penthièvre (pāṇ-tyāvr), an ancient county of Brittany, now forming the French department of Mor-

bihan. It belonged in earlier times to several branches of the house of Brittany, but at a later period came to the houses of Brosse and Luxembourg, and in 1569 was erected in their favor by Charles IX into a dukedom. It afterwards fell to the crown, and was given, in 1697, by Louis XIV to one of his illegitimate sons by Madame de Montespan, the Count of Toulouse, who died in 1737. His only son and heir was Louis Jean Marie de Bourbon, duke of Penthièvre, born in 1725; died in 1793; served as general at Dettingen and Fontenoy, and was father-in-law to King Louis Philippe.

Pentland Firth (pent'land), a channel separating the mainland of Scotland from the Orkney Islands, and connecting the North Sea with the Atlantic Ocean. It is about 17 miles long east to west, and 6 to 8 miles broad. A current, setting from east to west, flows through it with a velocity of 3 to 9 miles an hour, causing many eddies, and rendering its navigation difficult and dangerous.

Pentland Hills, a range of Scotland, in the counties of Edinburgh, Peebles, and Lanark, commencing 4½ miles south by west of Edinburgh, and extending southwest for about 16 miles. The highest summit, Scald Law, is 1898 feet above sea-level.

Penumbra (pen-um'bra), the partial shadow between the full light and the total shadow caused by an opaque body intercepting the light from a luminous body, the penumbra being the result of rays emitted by part



Umbra and Penumbra.

of the luminous body. An eye placed in the penumbra would see part of the luminous body, part being eclipsed by the opaque body; an eye placed in the 'umbra,' or place of total shadow, would receive no rays from the luminous body; an eye placed anywhere else than in the penumbra and umbra sees the luminous body without eclipse. The subject is of importance in the consideration of eclipses. In a partial eclipse of the sun, as long as any part of the same is visible the parties observing are in the *penumbra;* when the eclipse is total, in the *umbra.* The cut shows the phenomena of the umbra and penumbra in the case of a luminous body between two opaque bodies, the one larger, the other smaller than itself. See also *Eclipse.*

Penza (pān'za), a government of Russia, bounded by Nijni-Novgorod, Tambov, Saratov, and Simbirsk; area, 14,996 square miles; pop. 1,491,215. Its surface, though generally flat, is intersected by some low hills separating the basins of the Don and Volga. About 60 per cent. of the soil is arable, the chief crops being rye, oats, buckwheat, hemp, potatoes, and beet-root, and about 14 per cent. is under meadows or grazing land. The forests are extensive. The chief exports are corn, spirits, timber, metals, and oils.—PENZA, the capital, is on an eminence at the junction of the Penza and Sura, 440 miles southeast of Moscow. It was founded in 1666 as a defense against Tartar incursions, is mostly built of wood, has a cathedral, several other churches, a theater, etc. Pop. 61,851.

Penzance (pen'zans), a municipal borough and seaport of England, in the county of Cornwall, picturesquely situated on the northwest of Mount's Bay, 26 miles southwest of Truro. The harbor has accommodation for large vessels, and there is a considerable export of tin and copper, china-clay, and pilchards. The pilchard and other fisheries employ many persons. Penzance has a fine climate and pleasant environs, and is becoming a favorite watering-place. Pop. 13,136.

Peony (pē'u-ni; *Pæonia*), a genus of plants belonging to the natural order Ranunculaceæ, and very generally cultivated in gardens for the sake of their large showy flowers. The species are mostly herbaceous, having perennial tuberous roots and large deeply-lobed leaves. The flowers are solitary, and of a variety of colors, crimson, purplish, pink, yellow, and white. The flowers, however, have no smell, or not an agreeable one, except in the case of a shrubby species, *P. Moutan,* a native of China, of which several varieties, with beautiful whitish flowers stained with pink, are cultivated in gardens. The roots and seeds of all the species are emetic and cathartic in moderate doses. *P. officinālis* or *festiva,* the common peony of cottage gardens, was formerly in great repute as a medicine.

People's Palace, a building in the East End of London, situated in Mile-end Road, opened by Queen Victoria, May, 1887. It pro-

vides for the population of the East End a hall for concerts, entertainments, etc., a library and reading-rooms, gymnasia, swimming-baths, social-meeting rooms, rooms for games, refreshment rooms, a winter-garden, technical schools, etc. The nucleus of the palace was the Beaumont Institute, founded by Mr. J. T. B. Beaumont (died 1840), who left £12,500 to establish an institution for the moral and intellectual improvement of the working classes in the East End of London. A movement set on foot by a novel by Mr. Walter Besant — *All Sorts and Conditions of Men* — resulted in raising the fund to £75,000, and the establishment of the People's Palace.

People's Party, or POPULIST PARTY, a political party of the United States which held its first national convention in 1892. Its platform demanded a legal tender currency issued directly by the government, not through the medium of banks; free coinage of gold and silver at a ratio of 16 to 1; a graduated income tax; government ownership and operation of railroads, telegraphs and telephones; that land should not be monopolized by aliens, and that railroad lands should be reclaimed and held for settlers. This party had been preceded by the 'Farmers' Alliance,' holding similar views. It nominated candidates for President and Vice-President in 1892 and in 1896, and in 1900 endorsed the Democratic nomination of William J. Bryan. It nominated candidates also in 1904 and 1908, but its vote greatly fell off, becoming insignificant in the latter year.

Peoria (pē-ō′ria), a city of Illinois, capital of Peoria Co., on the west bank of the Illinois River (here called from its width Lake Peoria), 160 miles s.w. of Chicago. Peoria is a great railway center and is connected with St. Louis by river steamers and with Chicago by the Michigan Canal. It is a rapidly rising place, the seat of a large grain traffic, especially in corn and oats, and is extensively engaged in pork-packing. It is an important manufacturing city, distilling being its leading interest, while the production of agricultural implements stands second. There are various other large products. Peoria has several notable public buildings, a public library with over 100,000 volumes, etc. Pop. 66,950.

Peperino (pep-ėr-ē′nō), the Italian name for a volcanic rock composed of sand, scoriæ, cinders, etc., cemented together. It is so named from the small peppercorn-like fragments of which it is composed. The Tarpeian Rock in Rome is composed of red peperino, and the catacombs are the hollows of old quarries dug in it.

Pepin (pep′in), the name of two distinguished Frank rulers of the 8th century, under the last kings of the Merovingian dynasty.— 1. PEPIN OF HERISTAL, major-domo at the court of Dagobert II, was, after the death of the king, appointed Duke of the Franks, and under a feeble regency ruled the kingdom with almost despotic sway. Charles Martel was his natural son.— 2. PEPIN LE BREF, son of Charles Martel, was, by agreement with the pope, proclaimed King of the Franks in 752, after the deposition of Childeric III. He defeated the Longobards in Italy, and made the Holy See a present of the lands which he conquered from them — the origin of the temporal power of the popes. He became the founder of the Carlovingian dynasty, being succeeded at his death in 768 by his son, Charles the Great, usually called Charlemagne.

Pepper (pep′er; *Piper*), a genus of plants, the type of the natural order Piperaceæ. The *Piper nigrum*, which furnishes the black pepper of commerce, is a native of the East Indies, where it is cultivated on an extensive scale. It is a climbing plant, with broad, ovate, acuminate leaves, and little globular berries, which, when ripe, are of a bright-red color. The pepper of Malacca, Java, and especially of Sumatra, is the most esteemed. Its culture has been introduced into various other tropical countries. White pepper is the best and soundest of the berries, gathered when fully ripe, and deprived of their external skin. The *Chavica Betle*, or betel, belongs to the same natural order. Cayenne pepper, Guinea pepper, bird pepper, etc., are the produce of species of *Capsicum*, natural order Solanaceæ. Jamaica pepper is pimento or allspice.

Black Pepper (*Piper nigrum*).

Pepper, WILLIAM, physician, born at Philadelphia in 1843, son of a distinguished physician of the same name. He graduated in medicine at the University of Pennsylvania, became a professor there in 1876, and was made

Provost of the University in 1880, resigning in 1894. He was very active in extending the scope and adding to the endowment of the University, which owes its present high standing largely to him. He was also actively connected with the Public Library of Philadelphia, the Commercial Museums, and other institutions. He died in 1898.

Peppercorn Rent, a nominal rent to be paid on demand. A nominal rent of one peppercorn a year is an expedient for securing acknowledgment of tenancy in cases where houses or lands are let virtually free of rent.

Peppermint. See *Mint.*

Peppermint-tree, the *Eucalyptus piperita*, a native of New South Wales.

Pepper-pot, a much-esteemed West Indian dish, the principal ingredient of which is cassareep (which see), with flesh of dried fish and vegetables, chiefly the unripe pods of the ochra, and chillies.

Pepper-root, a herbaceous plant of the nat. order Cruciferæ, a native of the United States, so called from the pungent, mustard-like taste of its root, which is used as a condiment.

Pepperwort, a plant of the genus *Lepidium*, one species of which (*L. sativum*), the common garden cress, is cultivated for the table. See also *Dentaria.*

Pepsine (pep'sin), an active principle of the gastric juice, a peculiar animal principle secreted by the stomach. The pepsine or pepsia of pharmacy is a preparation of the mucous lining of the stomach of the pig or calf. It is often prescribed in cases of indigestion connected with loss of power and tone of the stomach.

Pepys (peps or pep'is), SAMUEL, secretary to the admiralty in the reigns of Charles II and James II, was born at Brampton, Huntingdonshire, in 1632, and educated at Cambridge. He early acquired the patronage of Sir Edward Montagu, afterwards Earl of Sandwich, who employed him as secretary in the expedition for bringing Charles II from Holland. On his return he was appointed one of the principal officers of the navy. In 1673, when the king took the admiralty into his own hands, Pepys was appointed secretary to that office, and performed his duties with great credit. During the excitement of the Popish Plot he was committed to the Tower, but was after some time discharged without a trial, and reinstated in his office at the admiralty, which he held until the abdication of James II. He died in 1703. He was president of the Royal Society for two years; but his title to fame rests upon his *Diary* (1659–69), which is a most entertaining work, revealing the writer's own character very plainly, giving an excellent picture of contemporary life, and of great value for the history of the court of Charles II. It is in shorthand, and was discovered among a collection of books, prints, and manuscripts bequeathed by Pepys to Magdalene College, Cambridge; first printed in 1825.

Pequots, a tribe of American Indians, a branch of the Mohegans, residing near the Thames River, in Connecticut. Strong and warlike, they opposed the settlement of the English in Connecticut. Hostilities broke out in 1637, the Indian town was burned, and the tribe practically annihilated.

Pera (pā'ra), a suburb of Constantinople (which see).

Peræa (pe-rē'a), a district of Palestine eastward of the Jordan, the 'Gilead' of the Old Testament.

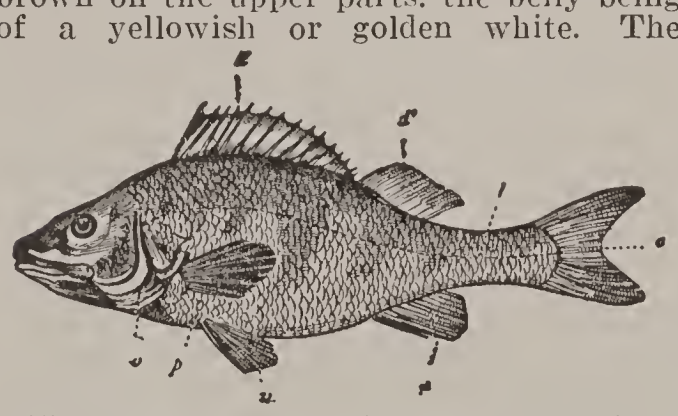
Perak (pā'rȧk), a native state of the Malay Peninsula, extending about 80 miles along the west coast, and stretching inward to the mountain range which forms the backbone of the peninsula; area, 7949 sq. m., pop. 329,665. Since 1875 Perak has been practically a dependency of the Straits Settlements (which see), the native rajah being controlled by a British resident appointed by the governor of that colony, and English officers holding many posts under the native government. Perak is a flourishing and progressive country. Roads and railways are constructed or being made and its rich resources developed. Tin is produced in large quantities, and tapioca, pepper, rice, sugar, coffee, cacao, and cinchona are successfully cultivated. The chief town is Thaipeng, but the headquarters of the British resident are at Kwala Kangsa.

Perception (pur-sep'shun), in philosophy, the faculty of perceiving; the faculty by which we have knowledge through the medium or instrumentality of the bodily organs, or by which we hold communication with the external world. Perception takes cognizance only of objects without the mind. We *perceive* a man, a horse, a tree; when we think or feel, we are *conscious* of our thoughts and emotions. Two great disputes are connected with perception, both brought into full prominence by Bishop Berkeley. The first is the origin of our judgments of the distances and real mag-

nitudes of visible bodies. The second question has reference to the grounds we have for asserting the existence of an external material world, which, according to Berkeley, was connected with the other. See *Idealism.*

Perceval (pėr′se-val), SPENCER, an English statesman, son of John Perceval, Earl of Egmont, born in 1762; received his education at Harrow and Trinity College, Cambridge. On quitting the university he studied law. In 1801 he became solicitor-general, and in 1802 attorney-general. In 1807 he was appointed chancellor of the exchequer, and on the death of the Duke of Portland, in 1809, he became premier. In this post he continued till May 11, 1812, when a person named Bellingham shot him dead in the lobby of the House of Commons. Perceval was a keen debater and a fluent and graceful speaker, but was shallow and intolerant, and unequal to the task of leading the councils of a great nation.

Perch, a genus of acanthopterous fishes, forming the type of the perch family (Percidæ). The common perch (*Perca fluviatilis*) is a common tenant of fresh-water lakes and rivers. The body is broad, and somewhat flattened laterally. There are two dorsal fins, the anterior supported by very strong spines. It is colored a greenish-brown on the upper parts. the belly being of a yellowish or golden white. The



The common Perch (*Percha fluviatilis*). *o,* Gill-cover, with the gill-slit behind it; *p,* One of the pectoral fins, the left; *v,* The left ventral fin; *d,* The first dorsal fin; *d′,* The second dorsal fin; *c,* The caudal fin or tail; *a,* The anal fin; *l,* Lateral line.

sides are marked with from five to seven blackish bands. The average weight is from 2 to 3 lbs. The perch is a voracious feeder, devouring smaller fishes, worms, etc. The American yellow perch is one of the most common and beautiful of the fresh-water fishes of the United States. The *Serrānus cobrilla* and *S. gigas* (giant perch) are also sometimes termed 'sea-perches.' For the climbing-perch of India see *Climbing-perch.*

Perch, as a measure of length, see *Pole.*

Perchers, or PERCHING BIRDS. See *Insessores.*

Perchloric Acid (per-klō′rik; H Cl O_4) is prepared by the action of strong sulphuric acid upon potassium perchlorate. It is a colorless, sirupy liquid, resembling sulphuric acid. Brought into contact with organic matter it is instantly decomposed, often with explosive violence. The perchlorates have the general formula $MClO^4$, where M represents a monovalent metal, such as potassium or sodium.

Per′cidæ. See *Perch.*

Percussion (per-kush′un), in medicine, that method of diagnosis which consists in striking gently on the surface of one of the cavities of the body, and then endeavoring to ascertain from the sound produced the condition of the organ lying beneath. Percussion is most frequently used on the chest, but it is also occasionally applied to the cavity of the abdomen, the head, etc.

Percussion Caps are small copper cylinders, closed at one end for conveniently holding the detonating composition which is exploded by percussion, so as to ignite the powder in certain kinds of firearms. The copper cap came into general use between 1820 and 1830.

Percy (per′si), the name of a noble family who came to England with William the Conqueror, and whose head, WILLIAM DE PERCY, obtained thirty knights' fees in the north of England. A descendant, also named WILLIAM, who lived in the early part of the 12th century, left behind him two daughters, the elder of whom died childless, and the younger, Agnes, married Josceline of Lorain, brother-in-law of Henry I, who assumed the surname of his bride. His son, RICHARD DE PERCY, was one of the twenty-five barons who extorted Magna Charta from King John. His great-grandson, HENRY, LORD PERCY, was created Earl of Northumberland in 1337. He was Marshal of England at the coronation of Richard II, against whom, however, he took up arms, and succeeded in placing the crown on the head of the Lancastrian aspirant, Henry IV. He took up arms against this king also, but his forces were beaten at Shrewsbury (1403), where his son, Henry Percy (Hotspur), fell; and again at Barnham Moor (1407–8), where he himself fell. His titles were forfeited, but were revived in favor of his grand-

son HENRY, who was appointed lord high constable of England, and who fell fighting in the Lancastrian cause at St. Albans (1453). For the same cause his son and successor shared the same fate at Towton (1461). The fourth earl was murdered during a popular rising, caused by his enforcing a subsidy ordered by the avaricious Henry VII. The sixth and seventh earls fell by the hands of the executioner in the reigns of Edward VI and Elizabeth respectively. The eighth died a violent death in the Tower, where he was confined on a charge of taking part in a plot in favor of Mary of Scotland. ALGERNON, the tenth earl, took part in the civil war against Charles I, and afterwards used all his influence to bring about the Restoration. JOSCELINE, the eleventh earl, died without male issue; his only daughter married Charles, duke of Somerset, and became the mother of ALGERNON, DUKE OF SOMERSET, who was created Earl of Northumberland, with remainder to his son-in-law, SIR HUGH SMITHSON, a Yorkshire baronet of good family. The latter succeeded to the earldom in 1750, assuming the name of Percy, and in 1766 received the ducal title. The present duke thus represents the female line of the ancient historical house.

Percy, THOMAS, Bishop of Dromore, in Ireland, was born at Bridgenorth in 1728, and graduated at Christ Church, Oxford, in 1753. He held several livings, in 1769 was appointed chaplain to the king, and in 1778 raised to the deanery of Carlisle, which he resigned four years after for the Irish bishopric of Dromore. He died at Dromore in 1811. The most popular of his works are his *Reliques of Ancient English Poetry*, based on an old manuscript collection of poetry, but much modernized in style. The work was published in 1765, and materially helped to give a more natural and vigorous tone to English literature, then deeply tainted with conventionalism.

Perdix (per'diks), the generic name of the true partridges. The common partridge is *P. cinereus*.

Peregrine Falcon. See *Falcon*.

Perekop (pā-rā-kop'), a town of Southern Russia, government of Taurida, 85 miles N.N.W. of Simferopol, on the Isthmus of Perekop, formerly a place of some military importance. The isthmus, about 20 miles long, by 4 miles wide where narrowest, connects the Peninsula of the Crimea with the mainland, and separates the Sea of Azov from the Black Sea.

Père-la-Chaise (pār-lȧ-shāz), a famous cemetery to the northeast of Paris, opened in 1804. It occupies ground a part of which was granted to Père de la Chaise, or Chaize, confessor of Louis XIV. Its present extent is 212 acres, and it contains the burial-places of great numbers of eminent Frenchmen.

Perennial (pe-ren'i-al), in botany, a term applied to those plants whose roots subsist for a number of years, whether they retain their leaves in winter or not. Those which retain their leaves are called *evergreens;* such as cast their leaves are called *deciduous.* Perennial herbaceous plants, like trees and shrubs, produce flowers and fruit year after year.

Perennibranchiata (per-en-i-bran-ki-ā'ta), a section of the amphibian order Urodela, in which the branchiæ or gills of early life persist throughout the entire existence of the animal, instead of disappearing when the lungs are developed. Examples are seen in the Proteus, Siren, and Axolotl. See *Amphibia.*

Pereyaslavl (pā-rā-yas'lavl), an old town of Southern Russia, government of Poltava, 175 miles W.N.W. of Poltava. Pop. 14,609.

Pereyaslavl-Zalyesskii, an old town of Central Russia, government of Vladimir, 87 miles northeast of Moscow. It has extensive cotton manufactures. Pop. 8662.

Perfectionists (per-fec'shun-istz), or BIBLE COMMUNISTS, popularly named FREE-LOVERS, an American sect founded in 1838 by John Humphrey Noyes. Noyes was employed as a law-clerk at Putney, in Vermont, when the fierce religious revival of 1831 spread over the New England States, but he abandoned law for religion, and took upon himself the restoration of the primitive Christian ideal. His distinctive doctrines were — 1st, reconciliation to God and salvation from sin — purely matters of faith; 2d, recognition of the brotherhood and the equality of man and woman; and 3d, community of labor and its fruits. In 1838 he succeeded in organizing a society giving expression to his views at Putney. Besides himself this included his wife, his mother, and his sister and brother, who were joined by several other families. All property was thrown into a common stock; all debts, all duties fell upon the society, which ate in one room, slept under one roof, and lived upon one common store. All prayer and religious service was

stopped, Sunday was unobserved, family ties were broken up, and a complex marriage system was established, by which each man became the husband and brother of every woman; every woman the wife and sister of every man. They held that true believers are free to follow the indications of the Holy Spirit in all things, nothing being good or bad in itself. Consequently, they rejected all laws and rules of conduct except those which each believer formulated for himself; but to prevent the inconveniences arising from an ignorant exercise of individual liberty, they introduced the 'principle of sympathy,' or free public opinion, which in fact constituted the supreme government of the society. At length Putney became too hostile for this state of affairs to continue; the establishment was broken up; but about fifty of the picked and tried men, with as many women and children, held together. Uniting their means, they, in 1847, bought a piece of forest-land (about 600 acres) at Oneida Creek, a sequestered district of New York State, and in the course of twenty years they made it one of the most productive estates in the Union. The family or society numbered at one time over 300 members, with a branch community of 50 or 60 members at Wallingford, Connecticut. This status continued for thirty years; but the public opinion of the neighborhood began to demand that the social practices of the society should be abandoned; and this was done in 1879, under the counsel of its founder and director, Mr. Noyes. Marriage and family life were introduced; and in 1880 communism of property gave way to joint-stock, and the society was legally incorporated as the Oneida Community, Limited. Some of the more necessary and common communistic features, however, were preserved, such as common dwellings, a common laundry, library, reading-room, etc.

Perfumes (per'fūmz), substances emitting an agreeable odor, and used about the person, the dress, or the dwelling. Perfumes of various sorts have been held in high estimation from the most ancient times. The Egyptians, Hebrews, Phœnicians, Assyrians and Persians are known to have made great use of them, as did also the Greeks and Romans. In the middle ages France and Italy were most conspicuous for the use and preparation of perfumes. Perfumes are partly of animal but chiefly of vegetable origin. They may be divided into two classes, crude and prepared. The former consist of such animal perfumes as musk, civet, ambergris, and such vegetable perfumes as are obtained in the form of essential oils. The prepared perfumes, many of them known by fancy names, consist of various mixtures or preparations of odorous substances made up according to recipe. At the present time the manufacture of perfumes is chiefly carried on in Paris and London, and in various towns near the Mediterranean, especially in the south of France. Certain districts are famous for certain productions; as Cannes for its perfumes of the rose, tuberose, cassia, jasmine; Nîmes for thyme, rosemary and lavender; Nice for the violet and mignonette. England claims the superiority for her lavender, which is cultivated upon a large scale at Mitcham in Surrey. The seat of the production of otto of roses is Bulgaria, especially in the cantons of Kezanlik and Karlova. Of late years chemists have succeeded in producing a variety of artificial odoriferous substances, some identical with plant perfumes, others yielding new odors. Thus artificial musk differs widely in odor from true musk, but it is a delightful perfume, with many applications in perfumery.

Pergamus (pėr'ga-mus), or PERGAMUM, an ancient city in the west of Asia Minor, north of Smyrna, near the Caïcus. It was founded by emigrants from Greece, and rose to importance about the commencement of the third century B.C., when it was made the capital of an independent state, which subsequently became a Roman province. Under the Byzantine emperors the prosperity of the city rapidly declined. Pergamus was one of the most magnificent cities of antiquity. Many fine remains still exist in evidence of its former grandeur, and valuable results have been obtained through excavations carried out by the Prussian government. The modern town Bergama (which see) occupies its site.

Pergolesi (pèr-go-lā'sē), GIOVANNI BATTISTA, an Italian musical composer, born at Jesi in 1710; studied at the conservatory of music at Naples; produced his first oratorio and his first opera in 1731; was appointed chapel-master at Loretto in 1734; and died at Pozzuoli in March, 1736. His sacred compositions and his chamber music rank high in the history of music. Among the many Italian composers Pergolesi is noted for the purity of his style of composition.

Perianth (pe'ri-anth), in botany, the floral envelope, the calyx and corolla, or either. This term is applied when the calyx and corolla are combined so that they cannot be satisfactorily distinguished from each other, as in many monocotyledonous plants, the

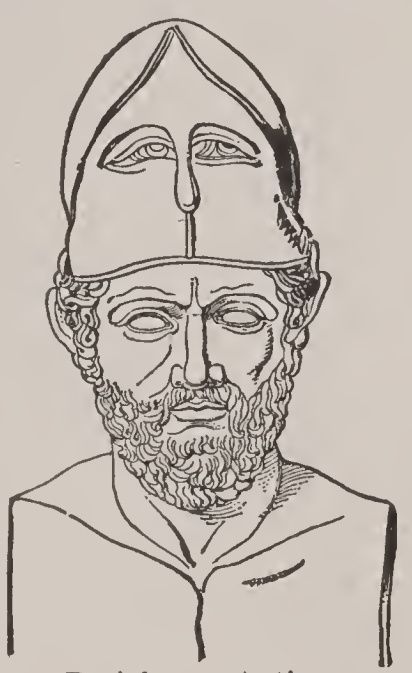
tulip, orchis, etc. The perianth is called *single* when it consists of one verticil, and *double* when it consists of both calyx and corolla.

Pericarditis (per-i-kar-dī′tis), inflammation of the membraneous sac (pericardium, which see) containing the heart. In the acute stage of the disease there is exudation of lymph or serum; at a later stage false membranes are formed, and at a still later stage the two sides become glued together, forming adherent pericardium. This is generally followed by changes in the substance of the heart, or in its internal surface, orifices, or valves, and a fatal termination is rarely long delayed. The symptoms of pericarditis are: 1st, pain more or less acute in the location of the heart; fever is present with loss of appetite and dry tongue. An anxious respiration and a feeling of overwhelming oppression are also present, with frequent sighing, which gives momentary relief. Most of the symptoms are aggravated by motion or a high temperature. For the diagnosis of pericarditis we must rely mainly on the physical signs, but it is only when the effusion is considerable that investigation by percussion is of much use. In ordinary cases, where adhesion takes place, there may be an apparently complete recovery at the end of three weeks or less; but adhesion frequently gives rise to other structural changes of the heart, and then fatal disease of that organ almost always follows. In slight cases a real cure without adhesion may be effected. This disease is frequently brought on by exposure to cold or draughts when the body is warm and perspiring. Its most frequent occurrence is in connection with acute rheumatism.

Pericardium (per-i-kar′di-um), the investing fibro-serous sac or bag of the heart in man and other animals. In man it contains the heart and origin of the great vessels. It consists of two layers, an outer or *fibrous*, and an inner or serous layer. The inner surface of the membrane secretes a serous fluid, which in health is present only in sufficient quantity to lubricate the heart, and so to facilitate its movements within the sac.

Pericarp (per′i-karp), in botany, the seed-vessel of a plant, or the whole case or covering in which the seed is inclosed. The pericarp often consists of very distinct layers, as in the plum, in which the external skin forms the *epicarp*, the pulp or flesh the *sarcocarp*, and the stone which encases the seed the *endocarp*. Pericarps receive such names as capsule, silique, legume, drupe, berry, nut, cone, etc.

Pericles (per′i-klēz), one of the most celebrated statesmen of ancient Greece, born at Athens about 494 B. C. He was connected by family relations with the aristocracy, but as Cimon was already at its head he endeavored to gain the favor of the popular party. In this he fully succeeded by his eloquence, abilities, and political tactics, so that on the death of Cimon, in 449 B. C., Pericles became virtual ruler of Athens. By his great public works he flattered the vanity of the Athenians, while he beautified the city and employed many laborers and artists. His chief aim was to make Athens undoubtedly the first power in Greece, as well as the chief center of art and literature, and this position it attained and held for a number of years. (See *Greece.*) At the commencement of the Peloponnesian war (B. C. 431), in which Athens had to contend against Sparta and other states, Pericles was made commander-in-chief. The Spartans advanced into Attica, but Pericles had made the rural population take refuge in Athens and refused battle. After they retired he led an army into Megaris, and next year he commanded a powerful fleet against the Peloponnesus. In 430 B. C. a plague broke out in Athens, and for a brief period Pericles lost his popularity and was deprived of the command. The people, however, soon recalled him to the head of the state, but amid his numerous cares he was afflicted by domestic calamities. Many of his friends, and his two sons, Xanthippus and Paralus, were carried off by the plague; and to console him for this loss the Athenians allowed him to legitimize his son by Aspasia. He now sunk into a lingering sickness, and died B. C. 429, in the third year of the Peloponnesian war. Pericles was distinguished by intellectual breadth, elevated moral tone, unruffled serenity, and superiority to the prejudices of his age. His



Pericles.— Antique bust.

name is intimately connected with the highest glory of art, science, and power in Athens.

Peridote (pėr′i-dōt), a name given by jewelers to the green transparent varieties of olivine. It is usually some shade of olive-green or leek-green. Peridote is found in Brazil, Ceylon, Egypt, and Pegu. It is a very soft gemstone, difficult to polish, and, when polished, liable to lose its luster and to suffer by wear.

Périer (pā-ri-ā), Casimir, a French statesman, was born at Grenoble in 1777; educated at Lyons, and served with honor in the campaigns of Italy (1799 and 1800). In 1802 he established a prosperous banking house in company with his brother. In 1817 he was elected to represent the department of the Seine in the Chamber of Deputies. Here he became one of the leaders of the opposition under Charles X, and was distinguished as an eloquent advocate of constitutional principles and an enlightened financier. After the revolution of 1830 he was prime-minister to Louis Philippe. Died in 1832. His grandson, of the same name, was President of France, 1894–95.

Perigee (pėr′i-jē), that point in the orbit of the moon which is at the least distance from the earth. See *Apogee.*

Périgord (pā-ri-gōr), an old province of France. It formed part of the military government of Guienne and Gascony, and is now represented by Dordogne and part of Lot-et-Garonne.

Périgueux (pā-ri-g*eu*), a town of France, formerly capital of Périgord, now chief town of the department of Dordogne, on the right bank of the Isle, 68 miles E.N.E. of Bordeaux. There are bombazine and serge factories, iron and copper foundries, and a large trade in flour, wine, brandy, and the famous truffle *pâtés de Périgord.* Pop. (1906) 28,199.

Perihelion (pėr-i-hē′li-on; Greek, *peri*, near, and *hēlios*, the sun), that part of the orbit of the earth or any other planet in which it is at the point nearest to the sun. The 'perihelion distance' of a heavenly body is its distance from the sun at its nearest approach.

Perim (pā-rēm′), an island in the Strait of Bab-el-Mandeb, at the entrance to the Red Sea, about 10 miles from the Abyssinian and 1½ mile from the Arabian shore; 7 sq. miles in area. It has been held by Great Britain since 1857, and is under the government of Aden. It is of consequence from its commanding position, which renders it the key of the Red Sea. On its southwest side is a well-sheltered harbor capable of containing a fleet of warships.

Perimeter (pe-rim′i-tėr), in geometry, the bounds or limits of any figure or body. The perimeters of surfaces or figures are lines; those of bodies are surfaces.

Period (pē′ri-ud), in astronomy, the interval of time occupied by a planet or comet in traveling once around the sun, or by a satellite in traveling around its primary.

Periodicals (pē-ri-od′i-kalz), publications which appear at regular intervals, and whose principal object is not the conveyance of news (the main function of newspapers), but the circulation of information of a literary, scientific, artistic, or miscellaneous character, as also criticisms on books, essays, poems, tales, etc. Periodicals exclusively devoted to criticism are generally called *reviews*, and those whose contents are of a miscellaneous and entertaining kind *magazines;* but there is no great strictness in the use of the terms. The first periodical was published in France, being a scientific magazine, the *Journal des Savants*, issued in 1665, and still existing in name at least. The most famous French literary periodical is the *Revue de Deux Mondes*, begun in 1829, from 1831 issued fortnightly, and marked by an ability which has placed it in the front rank of the world's periodicals. Into it tales, poems, etc., are admitted, and the names of the contributors have to be attached to their articles. The earliest English periodical seems to have been the *Weekly Memorials for the Ingenious*, the first number of which is dated January, 1681–82, and which lasted but a year. It was followed by several other periodicals, which for the most part had but a brief existence. In the 18th century a number of monthly reviews appeared, including the *Monthly Review* (1749–1844); the *Critical Review* (1756–1817); the *British Critic* (1793–1843); the *Anti-Jacobin Review and Magazine* (1798–1821). At length in 1802 a new era in criticism was introduced by the *Edinburgh Review*, the organ of the Whigs, which came out every three months, and soon had a formidable rival in the *Quarterly Review* (1809), the organ of the Tories. In 1824 the *Westminster Review* was started by Bentham as the organ of utilitarianism and radicalism, and with it was afterwards incorporated the *Foreign Quarterly Review* (1827–46); and in 1836 the *Dublin Review* was established

as the organ of the Roman Catholic party. All the quarterlies still exist, with various monthly reviews of later date.

Passing over the *Tatler* (1709–10), *Spectator* (1711–12, revived 1714), etc., what should be considered to be *sui generis*, the first English magazine properly speaking may be said to be the *Gentleman's Journal, or Monthly Miscellany*, commenced in 1692. It was followed in 1731 by the *Gentleman's Magazine*, published by Cave. The success of Cave's venture brought out a host of imitators, the *London Magazine* (1732–84), the *Scots Magazine* (1739–1817), the *European Magazine* (1782–1826), and the *Monthly Magazine* (1796–1829), being among the chief of this class which were originated in the 18th century. To these a large number has since been added. Germany, Russia, the United States, and other countries were later in embarking actively in periodical publications, but the United States now stands first in activity in this field. The *North American Review*, the oldest of these, began as a quarterly in 1815, and is now published as a monthly. There followed the *Atlantic*, the finely illustrated *Harper's*, *Scribner's*, and *Century* magazines, the *Popular Science Monthly*, and a host of others of more recent date. The United States has no counterpart of the British reviews, but in lighter magazine literature has no rival in number and circulation of periodical publications.

Periodicity (pē-ri-u-dis'i-ti), the disposition of certain things or phenomena to recur at stated periods. It denotes the regular or nearly regular recurrence of certain phenomena of animal life, such as sleep and hunger. The first indication of a diseased state is generally a disturbance of the natural or acquired periodicity of the various functions of life.

Periosteum (per-i-os'tē-um), the fibrous membrane investing the bones, and which serves as a medium for the transmission of the nutritive bloodvessels of the bone. The periosteum firmly adheres to the surface of bones (including the inside of the long bones), save at their gristly or cartilaginous extremities, and it becomes continuous with the tendons or ligaments inserted into bones. When the periosteum, through disease or injury, becomes affected the blood supply and nutrition of the bone suffer, and in consequence the bone-tissue dies or becomes *necrosed*, and is exfoliated or thrown off. When a bone is fractured the periosteum plays an important part in the repair of the injury, new osseous material being deposited by the membrane.

Periostitis (per-i-os-tī'tis), inflammation of the periosteum, a painful ailment frequently brought on by sudden exposure to cold after being heated.

Peripatetic Philosophy (per-i-pa-tet'-ik), the philosophy of Aristotle and his followers, so-called, it is believed, because he was accustomed to walk up and down with his more intimate disciples while he expounded to them his doctrines (Greek, *peri*, about, *patein*, to walk). The philosophy of Aristotle starts from his criticism of the Platonic doctrine of ideas, in combating which he is led to the fundamental antithesis of his philosophy, that between matter and form. The notion or idea of a thing is not, he says, a separate existence, different from the thing itself, but is related to the thing only as form to matter. Every sensible thing is a compound of matter and form, the matter being the substance of which the thing consists, while the form is that which makes it a particular thing (a stone, for example, and not a tree), and therefore the same as its notion or idea. The form is the true nature of a thing. Origination is merely matter acquiring form, it is merely a transition from potential to actual existence. Everything that actually exists previously existed potentially in the matter of which it is composed. Matter is thus related to form as potentiality to actuality. And as there is, on the one hand, formless matter, which is mere potentiality without actuality, so, on the other hand, there is pure form which is pure actuality without potentiality. This pure form is the eternal Being, styled by Aristotle the first or prime mover. The whole of nature forms a scale rising from the lower to the higher of these extremes, from pure matter to pure form, and the whole movement of nature is an endeavor (incapable of realization) of all matter to become pure form. Motion is the transition from the potential to the actual. Space is the possibility of motion. Time is the measure of motion. According to his physical conception the universe is a vast sphere in constant motion, in the center of which is our earth. On this earth, as in all nature, there is a regular scale of beings, the highest of which is man, who, to nutrition, sensation, and locomotion, adds reason. The soul, which is merely the animating principle of the body and stands to the body in the relation of form to matter, cannot be thought of as separated from the

body; but the reason is something higher than that, and as a pure intellectual principle exists apart from the body, and does not share in its mortality. Practical philosophy is divided by Aristotle into ethics, economics, and politics. According to his ethical system the highest good is happiness, which depends on the rational or virtuous activity of the soul throughout life. Virtue is proficiency in willing what is conformed to reason. All virtues are either ethical or dianoetic. The former include justice or righteousness, generosity, temperance, bravery, the first being the highest. The dianoetic virtues are reason, science, art, and practical intelligence. For the attainment of the practical ends of life it is necessary for man to live in society and form a State.

The school of Aristotle (the Peripatetic school) continued at Athens uninterruptedly till the time of Augustus. Those who proceeded from it during the first two or three centuries after his death abandoned, for the most part, the metaphysical side of Aristotle's teaching, and developed chiefly his ethical doctrines, or devoted themselves to the study of natural history. Later Peripatetics returned again to the metaphysical speculations of their master, and many of them distinguished themselves as commentators on his works. No one of the philosophical schools of antiquity maintained its influence so long as the Peripatetic. The philosophy of the Arabians was almost exclusively Aristotelianism, that of the schoolmen (scholasticism) was also based on it, and even down to modern times its principles served as the rule in philosophical inquiries.

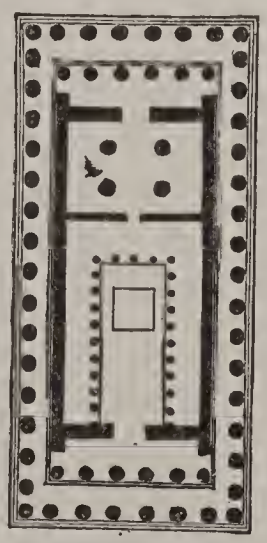
Periploca (per-ip'lo-ca), a genus of climbing plants belonging to the natural order Asclepiadaceæ, natives of South Europe and temperate and subtropical Asia, one being found in tropical Africa.

Periplus (per'i-plus; Gr. 'a sailing around'), a term applied particularly to the voyage of Africaya Hanus (which see).

Peripneumonia.

See *Pneumonia.*

Peripteral (pe-rip'tĕr-al), in Greek architecture, a term signifying surrounded by a row of columns; said of a temple or other building, especially of a temple the cella of which is surrounded by columns, those on the flanks (or sides) being distant one intercolumniation from the wall.



Plan of Peripteral Temple.

Peris (pē'rez), in Persian mythology, the descendants of fallen spirits excluded from paradise until their penance is accomplished. They belong to the family of the genii or jin, and are constantly at war with the Dēvs (the evil jin.) They are immortal, and spend their time in all imaginable delights. They are male and female, the latter being of surpassing beauty. Moore's *Paradise and the Peri* is based on this mythological notion.

Peris'sad. See *Artiad.*

Perissodactyla (per-is-o-dak'ti-la; Greek, *perissos*, odd, uneven; *daktylos*, finger or toe), one of the two great divisions of the order of Ungulata or Hoofed Quadrupeds, the animals included in which are distinguished by the fact that the toes, numbering one or three, are odd or uneven in number. This term is opposed to the Artiodactyla or 'Even-toed' Ungulata. The horse, tapir, and rhinoceros comprise the three existing genera.

Peristaltic Motion (per-i-stal'tik), also called VERMICULAR, the name given to certain movements connected with digestion observed in the stomach and intestines, which proceed with a wave-like or spiral motion, the object being to gradually propel forwards the contents of these viscera.

Peristyle (per'i-stīl), in architecture, a range of columns surrounding the exterior or interior of anything, as the cella of a temple. It is frequently but incorrectly limited in signification to a range of columns around the interior of a place, as, for example, an open court.

Peritoneum (per-i-tu-nē'um), the serous membrane lining the abdominal cavity and covering the intestines. Like all other serous membranes, the peritoneum presents the structure of a closed sac; one layer (*parietal*) lining the abdominal walls, the other or *visceral* layer being reflected over the organs of the abdomen. A cavity — the *peritoneal cavity* — is thus inclosed between the two layers of the membrane, and this contains in health a quantity of serous fluid just sufficient to moisten its surfaces.

Peritonitis (per-i-tu-nī'tis), inflammation of the peritoneum (which see). It is either acute or chronic, and the chronic form either sim-

ple or tubercular. It may be caused by injuries such as a blow or a wound piercing the belly; is often the result of ulcerations of the stomach or bowels, and of diseases of liver, kidneys, etc., and is sometimes a grave complication of puerperal fever. The symptoms are chiefly severe pain, increased by pressure, and fever. Emollient poultices and fomentations to the abdomen when the patient is able to bear their weight, bathing in tepid water, and small doses of opium are the means of cure resorted to. Fluid food is to be given — beef-tea, thin soup, milk, etc. For chronic cases nourishing diet is required, sea-air, friction of the belly with cod-liver oil, iodine treatment, etc.

Periwig. See *Wig*.

Periwinkle (per'i-wing-kl; *Vinca*), a genus of herbaceous or suffruticose plants of the natural order Apocynaceæ or Dog-bane family. The greater and lesser periwinkle (*Vinca major* and *Vinca minor*) are hardy plants, which blossom in early spring, and are pretty common in woods, hedges, and thickets in many parts of Europe and in the south of England. Their flowers are of a fine blue color, but when cultivated in gardens they may be made to yield purple and variegated flowers, both single and double.

Periwinkle (*Littorina*), a genus of mollusca very common on the British coasts. The shell is spiral, has few whorls, and is without a nacreous lining; the aperture is rounded and entire or unnotched (holostomatous). The common periwinkle (*L. littorea*) occupies the zone between high and low water marks, and is gathered and eaten in immense quantities. It is called the *wilk* in Scotland, in some parts simply the *buckie*, but is quite different from the mollusc called *whelk* (*Buccinum*) in England.

Perjury (pėr'ju-ri), the act or crime of willfully making a false oath in judicial proceedings in a matter material to the issue or cause in question. The penalties of perjury attach to willful falsehood in an affirmation made by a Quaker or other witness where such affirmation is received in lieu of an oath. Perjury is a misdemeanor punishable in England and the United States, at common law, by fine or imprisonment; in Scotland the punishment is penal servitude or imprisonment. Popularly, the mere act of making a false oath, or of violating an oath, provided it be lawful, is considered perjury.

Perm (pėrm), an eastern government of Russia, partly in Europe and partly in Asia; area, 128,211 sq. miles. It is traversed north to south by the Ural chain, and is well watered by rivers belonging to the Petchora, Tobol (affluent of the Obi), and Kama systems. North of the 60th degree regular culture becomes impossible, and the far greater part of the surface is occupied by forests and marshes. The government is rich in minerals, comprising iron, silver, copper, platinum, nickel, lead, and gold. There was formerly a principality of Perm, the Permians (a Finnish tribe) being under independent princes.— PERM, the capital of the government, is situated on the Kama, 930 miles northeast of Moscow. It has flourishing industries in iron, steel, leather, etc. In the neighborhood is a government manufactory of guns and munitions of war. Perm derives its commercial importance from being an emporium for the goods which are unshipped here from the steamers coming up the Kama, and despatched by rail, car, or sledge to Siberia. Pop. 45,403.

Permanganate (pėr-man'ga-nāt), a compound of permanganic anhydride, Mn_2O_7, and a base. Potassic permanganate is used as a disinfectant, and as a chemical reagent.

Permian Formation (pėr'mi-an), in geology, a rock formation which received its name from covering an extensive area in the government of Perm, in Russia. It rests upon the carboniferous strata and forms the upper portion of the Primary or Palæozoic geological age; being followed by the Triassic, the first of the Secondary systems.

Permit (pėr'mit), a written permission given by officers of the customs or excise for conveying spirits and other goods liable to duties from place to place.

Permutations and Combinations. In mathematics, the different orders in which any things can be arranged are called their 'permutations.' The 'combinations' of things are the different collections that can be formed out of them, without regarding the order in which the things are placed. Thus the permutations of the letters *a*, *b*, *c*, taken two at a time, are *ab*, *ba*, *ac*, *ca*, *bc*, *cb*, being six in number. Their combinations, however, are only three, namely *ab*, *ac*, *bc*, and so in all cases the number of permutations exceeds the number of combinations. The theory of permutations and combinations is of

some importance from its bearings on that of probabilities.

Pernambuco (pėr-nam-bö′kō), a town in Brazil, capital of the province of the same name, on the east coast. It consists of three distinct parts: Recife, occupying a small peninsula; San Antonio, on an island; and Boa Vista, on the mainland, the three parts being connected by iron bridges. Recife is the principal seat of business. In it are the custom-house, the exchange, a marine arsenal, etc. San Antonio has broad streets and many fine houses, and contains the episcopal palace, the theater, the military arsenals, etc. Boa Vista is the fashionable residential quarter. The harbor is formed by the reef, which incloses a belt of water about a mile in width. The trade is extensive. The principal exports are sugar and cotton; and the chief imports textile products and hardware. Pernambuco was founded by the Portuguese in the 16th century. From 1630 to 1654 it was in the hands of the Dutch, under whom it prospered greatly. It is now the third largest city in Brazil, and the second in point of commercial importance. Pop. about 130,000.—The province has an area of 49,625 square miles. The principal cultivated crops are the sugar-cane and cotton. It is chiefly the coast districts that are cultivated. The interior is either pasture-land or covered with forests yielding valuable timber, including Brazil wood, often called Pernambuco wood. Pop. 2,089,000.

Perpendicular Style, Abbey Church, Bath.

Pernau (pėr′nou), a seaport town and watering-place in Russia, in the government of Livonia, at the entrance of the river Pernau into the Gulf of Riga. Pop. about 13,000.

Péronne (pā-rōn), a fortified town in France, in the department of Somme, 32 miles east by north of Amiens, on the right bank of the Somme. Pop. (1906) 3698.

Peronospora (pėr-o-nos′po-ra), a genus of fungi, one species of which, *P. infestans* (otherwise *Botrytis infestans*), is said to be the cause of the potato disease.

Pérouse, La. See *La Pérouse.*

Peroxides (pėr-oks′īdz), the general name applied to the binary compounds of oxygen containing the greatest amount of that element; thus of the two oxides of hydrogen, H_2O and H_2O_2, the latter is the peroxide.

Perpendicular (pėr-pen-dik′ū-lar), in geometry, a line falling directly on another line, so as to make equal angles on each side. A straight line is said to be *perpendicular* to a curve when it cuts the curve in a point where another straight line to which it is perpendicular makes a tangent with the curve. In this case the perpendicular is usually called a *normal* to the curve.

Perpendicular Style, in architecture, a variety of the pointed Gothic, the latest variety to be introduced, sometimes called the *florid* or *Tudor* style of *Gothic.* It prevailed in England from about the end of the 14th to the middle of the 16th century. It is chiefly characterized by the predominance of straight lines in the design, and especially in its tracery. Another feature is the lofty square towers of its churches, divided into stages by bands, and each stage filled with windows. The mullions of the windows are vertical, generally rise to the main arches, and are often crossed by horizontal bars or transoms. Large windows are a distinctive feature of this style. The tracery of the doors is similar to that of the windows. There are two kinds of roof peculiar to the style — the vaulted roof, with fan-tracery, and the open timber-roof. Nearly all the colleges of Oxford and Cambridge are specimens of it, and it is also exemplified more or less in many of the English cathedrals; while the majority of the old parish churches of England also are of the Perpendicular style.

Perpetual Motion (pėr-pet′ū-al), a motion that, once originated, continues for ever or indefinitely. The problem of a perpetual motion consists in the invention of a machine which shall have the principles of its motion within itself, and numberless schemes have been proposed for its solution. It was not till the discovery of the principle of the conservation of energy (see *Energy, Conservation of*), experimentally proved by Joule, that the impossibility of the existence of a perpetual motion was considered to be a physical axiom. This principle asserts that the whole amount of energy in the universe, or in any limited system which does not receive energy from without, or part with it to external matter, is invariable. But every machine when in action does a certain amount of work, if only in overcoming friction and the resistance of the air, and as the perpetual motion machine can start with only a certain amount of energy, this is gradually used up in the work it does. A machine, in short, to be perpetual, would need to be one with no friction, and which met with no resistance of any kind. The mechanical arrangements which have been put forward as perpetual motions by inventors are either, (1) Systems of weights, which are allowed to slide on a wheel into such positions relatively to the axis of the wheel as to produce a constant turning movement in one direction; (2) Masses of liquid moving in wheels on the same principle; (3) Masses of iron arranged on the same principle, but subjected to the attractions of magnets instead of their own weights. Numbers of patents for such machines have been taken out, but in every case inventors have shown an ignorance of the elementary principles of natural philosophy.

Perpignan (per-pēn-yän), a city of Southern France, capital of dep. Pyrénées-Orientales, on the Têt, about 7 miles from the Mediterranean. Guarding the entrance from Spain into France by the East Pyrenees, it is strongly fortified, has a citadel and other works, and ranks as a fortress of the first class. The city has much of the Spanish character. The principal building is the cathedral, founded in the 14th century. Perpignan was formerly the capital of the county of Roussillon, was long under Spanish rule, and was not united to France till the Treaty of the Pyrenees in 1659. Pop. 32,683.

Perrault (pā-rō), Charles, a French writer, born in 1628; died in 1703; superintendent of royal buildings under Colbert. His highly mediocre poem, *Le Siècle de Louis le Grand* (1687), gave rise to the famous controversy on the comparative merits of the ancients and moderns, and his *Contes de ma Mère l'Oye* have procured for him the title of 'inventor of the French Fairy Tales.'

Perry (per′ri), Sir Charles H. Hastings, musical composer, born at Bournemouth, England, in 1838. He became director of the Royal College of Music at London, and was knighted in 1898. Among his noted works are: *Blest Pair of Sirens; Judith*, an oratorio; *Ode to St. Cecilia's Day; De Profundis;* and *L'Allegro.*

Perry, Oliver Hazard, naval officer, was born at Newport, Rhode Island, in 1785. He was in the navy in the second war with England, and in 1813 was sent to Lake Erie to build a fleet and seek to gain control of the waters of that lake. This he accomplished in a brilliant action, September 13, 1813, in which he annihilated the British fleet on the lake. Sent in 1819 as commander of a squadron to the West India waters, he died of yellow fever at Trinidad.

Perry, a fermented liquor made from the juice of pears.

Persecutions (pėr-se-kū′shunz), the name usually applied to periods during which the early Christians were subjected to cruel treatment on account of their religion. Ten of these are usually counted. The *first persecution* (64–68) was carried on under Nero. The cruelties practiced on this occasion are worthy of the ferocious instincts of that notorious tyrant. The apostles Peter and Paul are supposed to have suffered in this persecution. The *second persecution* (95–96) took place under the Emperor Domitian. Many eminent Christians suffered, and it is generally held that St. John was exiled to Patmos at this time. The *third persecution* began in the third year of Trajan (100). This persecution continued for several years, with different degrees of severity in many parts of the empire, and the severity of it appears from the great number of martyrs mentioned in the old martyrologies. The *fourth persecution*, under Marcus Aurelius (161–180), at different places, with several intermissions and different degrees of violence, continued the greatest part of his reign. It raged with particular fury in Smyrna and Lyons, and Vienne in Gaul. Polycarp and Justin Martyr are famous victims of this period. The *fifth* began in 197 under Severus. During the *sixth persecution*, under Maximian (235–238), only Christian teachers and ministers

were persecuted. Decius began his reign (249) with a persecution of the Christians (the *seventh*) throughout his dominions. This was the first really general persecution. Valerian in 257 put to death few but the clergy (*eighth persecution*); and the execution of the edict of Aurelian against the Christians (274) — the *ninth persecution*, as it was called — was prevented by his violent death. A severe persecution of the Christians (the *tenth*) took place under the Emperor Diocletian (303). Throughout the Roman Empire their churches were destroyed, their sacred books burned, and all imaginable means of inhuman violence employed to induce them to renounce their faith. Persecutions, principally directed against the clergy, continued with more or less vigor until Constantine the Great (312 and 313) restored to the Christians full liberty and the use of their churches and goods; and his conversion to Christianity made it the established religion in the Roman Empire.

Persephonē (pėr-sef'o-nē; Latin, *Proscrpĭna*, Anglicized *Proserpine*), in Greek mythology, the daughter of Zeus and Dēmētēr (Ceres). While she was gathering flowers near Enna in Sicily Pluto carried her off to the infernal regions, with the consent of Zeus, and made her his wife, but in answer to the prayers of Dēmētēr she was permitted to spend the spring and summer of each year in the upper world. In Homer she bears the name of Persephoneia. The chief seats of the worship of Persephonē were Attica and Sicily. In the festivals held in her honor in autumn the celebrants were dressed in mourning in token of lamentation for her being carried off by Pluto, while at the spring festivals they were clad in gay attire in token of joy at her return. In works of art Persephonē is sometimes represented as sitting by the side of her husband, and sometimes alone.

Persepolis (pėr-sep'u-lis), a Persian city of great antiquity, famous for its magnificent ruins, situated in a fertile valley of the present province, Farsistan. Its foundation is generally ascribed to Cyrus, but its history is involved in much doubt. It was one of Persia's capitals, and the place of burial for many of its monarchs; and it was the residence of Darius III when it was taken in 331 B. C. by Alexander the Great, who is said to have given it up to pillage and destruction, but this probably applies only to some of its principal palaces. The remains of large marble columns, vast portals, walls, huge figures, bas-reliefs, etc., amply prove the former extent and magnificence of its royal palace and temples.

Perseus (per'sūs), an ancient Greek hero, son of Danaë and Zeus. He was set adrift in the sea on his birth, in a chest along with his mother. But the chest reached the Island of Seriphos, and Perseus was brought up by the king of the island, who exacted a promise from him to fetch the head of the Gorgon Medusa. This he accomplished under the guidance of Hermes and Athena, and with the assistance of the nymphs. He also delivered Andromeda from a sea-monster (see *Andromeda*), an exploit which is frequently figured in ancient art. He was king of Tiryns and founder of Mycenæ. After his death Perseus was worshiped as a hero, and placed among the stars.

Perseus, the last king of the Macedonians, and an illegitimate son of Philip V, succeeded his father B. C. 178, and entered keenly into the hostilities which had previously broken out against Rome. The Romans sent an army against him and gained a signal victory at Pydna, 168 B. C. Perseus fled to Samothrace, but was given up to the Romans, and some years after died in captivity at Alba, near Rome.

Perseus, a northern constellation, surrounded by Andromeda, Aries, Taurus, Auriga, Camelopardalus, and Cassiopeia.

Perseverance (pėr-se-vēr'ans), or FINAL PERSEVERANCE, one of the peculiar doctrines of Calvinism, which infers that after the work of salvation has actually been commenced it will be carried forward without fail to a successful termination, though by means not inconsistent with human freedom.

Persia (per'shȧ, per'zhȧ; Persian, *Iran*), a kingdom of Western Asia; bounded north by Transcaucasian Russia, the Caspian Sea, and Russian Central Asia; east by Afghanistan and Beluchistan; south by the Persian Gulf; and west by Asiatic Turkey; extending for 700 miles from N. to S. and 900 miles from E. to W.; area, about 636,000 sq. m.; pop. est. about 10,000,000. The country is divided into 27 provinces; capital Teheran; chief trade centers, Teheran, Tabreez, Ispahan; chief ports, Bushire and Bender Abbas on the Persian Gulf. Other large towns are: Meshed, Balfroosh, Kerman, Yezd, Hamadān, Shirāz, Kazvin, Kom, Resht.

Physical Features.— Persia may be considered as an elevated plateau, broken by clusters of hills or chains of rocky

mountains, which alternate with extensive plains and barren deserts; the desert of Khorassan in the northeast alone absorbs about one-seventh of the entire area. Low tracts exist on the Persian Gulf and the Caspian Sea. The interior plains have an elevation of from 2000 to 6000 feet above the sea. This vast central plateau is supported in the N. and S. by two great mountain chains or systems, and from these all the minor ranges seem to spring. The north chain, an extension of the Hindu Kush, enters Persia from Northern Afghanistan, proceeds across the country, and reaches its greatest elevation on the south of the Caspian, where it takes the name of the Elburz Mountains, and attains in Mount Demavend a height of nearly 20,000 feet. Still further west it becomes linked with the mountains of Ararat. The other great mountain system runs from northwest to southeast nearer the Persian Gulf, is of considerable width, and forms several separate ranges. In one of these an elevation of 17,000 feet is reached. The rivers are few and insignificant. Not one of them is of any navigable importance, except the Euphrates, which waters only a small portion of the southwest frontier, and the Karun, recently opened to the navigation of the world. The latter is entirely within Persian territory, and flows into the Shat-el-Arab, or united Tigris and Euphrates. Of the streams which flow northwards into the Caspian the only important one is the Kizil-Uzen or Sefid Rud (White River), which has a course of about 350 miles. There are a great number of small fresh-water lakes, and a few very extensive salt lakes, the largest being Urumiah in the extreme northwest.

Climate, Products, etc.— The climate varies considerably in different provinces, and in the central plateau intense summer heat alternates with extreme cold in winter. The shores of the Persian Gulf are scorched up in summer; those of the Caspian Sea, especially the parts covered with dense forest, are humid, but also noted for malaria. The mineral wealth of Persia is but little developed. Iron, copper, lead, and antimony, are abundant; sulphur, naphtha, and rock-salt exist in great quantities; coal also exists. The turquoise mines of Nishapur are about the only ones receiving anything like adequate attention. The interior of Persia, particularly its eastern and southern regions, is mostly devoid of vegetation over large areas; the southwest has its forests of stunted oaks and other trees, and jungle; but on the Caspian the mountain-sides are covered with dense and magnificent woods of oak, beech, elm, and walnut, intermingled with box-trees, cypresses, and cedars. Lower down wheat and barley are extensively cultivated. In the level and rich plains below, the sugar-cane and orange come to perfection; the pomegranate grows wild; the cotton-plant and mulberry are extensively and successfully cultivated, and large tracts are occupied by the vine and orchards producing every kind of European fruit. In the low plains the only grain under extensive and regular culture is rice; the principal subsidiary crops are cotton, indigo, opium, sugar, madder, and tobacco. Excellent dates are produced on the southern coast tracts. Irrigation is well understood and extensively practiced. The domestic animals are: sheep, chiefly of the large-tailed variety; goats, some of which produce a wool little inferior to that of Cashmere; asses and mules of a large and superior description; horses of Arab, Turkoman, and Persian breeds, and camels. Wild animals include the lion, leopard, wolf, jackal, hyena, bear, porcupine, wild ass, gazelle, etc.

Manufactures and Trade.— The manufactures of Persia were once celebrated, but excepting some carpets and shawls, it may be said that the country has ceased to export manufactured articles. Its chief exports now are rice, dried fruits, opium, silk, wool, cotton, hides, pearls, and turquoises. Chief imports: textiles, china and glass, carriages, sugar, tea, coffee, petroleum, drugs, and fancy articles. The internal trade of the country is almost entirely carried on by caravans. The total exports and imports are valued at about $60,000,000; the revenue is about $7,000,000; the foreign debt is $16,757,000. There are some 6500 miles of telegraph lines in operation, and a regular postal service was organized in 1877.

Government.— The government of Persia has long been an absolute monarchy, the only control to which its ruler, the Shah, was subject being the precepts of the Koran. He surrounded himself with a certain number of advisers, forming a ministry, eleven of whom were heads of special departments. These ministers he called and dismissed at pleasure. In 1906 a constitution and a legislative assembly were granted and Persia came in a measure within the circle of limited monarchies.

People.— The population is chiefly made up of Iranians or pure Persians and Turanians (Turkish and Tartar tribes), and in religion belongs almost exclusively

to the Shiah sect of Mohammedans, or more properly to a subdivision of that sect. The priesthood is very influential and very bigoted. Education is comparatively well attended to, Persia being considered, next to China, the best-educated country in Asia. The Persians are rather short and slenderly built, fair in complexion, hair long and straight, but beard bushy, and almost invariably jet black. The women are beautiful, intellectual, and polite. The Persian is celebrated for his affable manners, but also for his craft and deceit. Polygamy is both authorized and encouraged.

History.— The original country of the Persians occupied a small portion of modern Persia on the north of the Persian Gulf. After being under the Assyrians, and next under the Medes, Cyrus (B.C. 559–529), by conquering and uniting Media, Babylonia, Lydia, and all Asia Minor, became the founder of the Persian Empire. The empire was further extended by his son and successor Cambyses (B. C. 529–522), who conquered Tyre, Cyprus, and Egypt; and by Darius I, who subdued Thrace and Macedonia, and a small part of India. His son Xerxes (486–465 B. C.) reduced Egypt, which had revolted under his father, and also continued the war against the European Greeks, but was defeated on the field of Marathon and at Salamis (480 B.C.), and obliged to defend himself against the Greeks in a disastrous war. Artaxerxes I (B.C. 465–425) had a long and comparatively peaceful reign. Artaxerxes was followed by Darius II or Darius Nothus, Artaxerxes II (Mnemon), Artaxerxes III (Ochus), and Darius III (Codomannus, B. C. 338–330), the last of this dynasty, known as the Achæmenian dynasty. He was defeated by Alexander the Great in three battles, lost his life, and the empire passed into the hands of his conqueror. On the dissolution of the Macedonian Empire, after the death of Alexander (323), Persia ultimately fell to his general Seleucus and his successors the Seleucidæ (312). They reigned over it till 236 B. C., when the last Seleucus was defeated and taken prisoner by Arsaces I, the founder of the dynasty of the Arsacidæ and of the Parthian Empire, of which Persia formed a portion, and which lasted till 226 A. D. The supremacy was then recovered by Persia in the person of Ardishír Babigán (Artaxerxes), who obtained the sovereignty of all Central Asia, and left it to his descendants, the Sassanidæ, so-called from Sassan, the grandfather of Ardishír. This dynasty continued to reign for about 417 years, under twenty-six sovereigns. The reign of Sapor II, called the Great (310–381), and that of Chosroes I (Khosru, 531–579), were perhaps the most notable of the whole dynasty. The latter extended the Persian Empire from the Mediterranean to the Indus, from the Jaxartes to Arabia and the confines of Egypt. He waged successful wars with the Indians, Turks, Romans, and Arabs. Chosroes II 591–628) made extensive conquests, but lost them again in the middle of the reign of the Byzantine Emperor Heraclius. His son Ardishír (Artaxerxes) III, but seven years old, succeeded him, but was murdered a few days after his accession. He was the last descendant of the Sassanidæ in the male line. Numerous revolutions now followed, until Yezdigerd III, a nephew of Chosroes II, ascended the throne in 632 at the age of sixteen. He was attacked and defeated by Caliph Omar in 636–645, and Persia became for more than 150 years a province of the Mohammedan Empire. The Arab conquest had a profound influence on Persian life as well as on the language and religion. The old Persian religion was given up in favor of Mohammedanism, only the Guebres (which see) remaining true to the faith of their fathers. About the beginning of the ninth century the Persian territories began to be broken up into numerous petty states. The Seljuks, a Turkish dynasty, who first became powerful about 1037, extended their dominions over several Persian provinces, and Malek-Shah, the most powerful of them, conquered also Georgia, Syria, and Asia Minor. Through Genghis Khan the Tartars and Mongols became dominant in Persia about 1220, and they preserved this ascendency till the beginning of the fifteenth century. Then appeared (1387) Timurlenk (Tamerlane) at the head of a new horde of Mongols, who conquered Persia and filled the world from Hindustan to the extremities of Asia Minor with terror. But the death of this famous conqueror in 1405 was followed not long after by the downfall of the Mongol dominion in Persia, where the Turkomans thenceforward remained masters for 100 years. The Turkomans were succeeded by the Sufi dynasty (1501–1736). The first sovereign of this dynasty, Ismail Sufi, pretended to be descended from Ali, the son-in-law of Mohammed. He assumed the title of shah, and introduced the sect of Ali (the Shiite or Shiah sect). The great Shah Abbas (1587–1628) introduced absolute power, and made Ispahan

THE KAJA, OR CARRIAGE OF PERSIA

This is the common method of traveling in Persia. The cushions in these little rooms fastened on a donkey's back make very comfortable riding-places.

his capital. Under Shah Soliman (1666–94) the empire declined, and entirely sunk under his son Hussein. A period of revolts and anarchy followed until Kuli Khan ascended the throne, in 1736, as Nadir Shah, and restored Persia to her former importance by successful wars and a strong government. In 1747 Nadir was murdered by the commanders of his guards, and his death threw the empire again into confusion. Kerim Khan, who had served under Nadir, succeeded, after a long period of anarchy, in making himself master of the whole of Western Iran or modern Persia. He died in 1779. New disturbances arose after his death, and continued until a eunuch, Aga Mohammed, a Turkoman belonging to the noblest family of the tribe of the Kajars, and a man of uncommon qualities, seated himself on the throne, which he left to his nephew Baba Khan. The latter began to reign in 1796 under the name of Futteh Ali Shah, and fixed his residence at Teheran. This monarch's reign was in great part taken up with disastrous wars with Russia and Turkey. In 1813 he was compelled to cede to Russia all his possessions to the north of Armenia, and in 1828 his share of Armenia. Futteh Ali died in 1834, leaving the crown to his grandson, Mehemet Shah, during whose reign Persia became constantly weaker, and Russian influence in the country constantly greater. He died in 1848, and was succeeded by his son Nasr-ed-Deen, born 1829. The latter was obliged to suppress a number of insurrections, and in 1851 a serious rebellion of the pure Persian party in Khorassan, who refused obedience to the Kajar dynasty on religious grounds. In May, 1852, he annexed the Sultanate of Herat, but was compelled to relinquish it by the British, and a second occupation in 1855 resulted in the landing of a British force on the Persian Gulf, the capture of Bushire, and the Peace of Paris (March 3, 1857). Persia afterwards came into the possession of portions of territory formerly belonging to Omân, Afghanistan, and Beluchistan. On the northeast the boundary between Persia and the Russian territory beyond the Caspian, after remaining long uncertain, was settled in the end of 1881, the lower course of the river Atrek, and farther east certain mountain ridges north of that river, forming the new boundary. Nasr-ed-Deen was assassinated in 1896, and his son, Mazaffer-ed-Deen, succeeded to the throne. The new Shah was a man of liberal ideas, who had made several visits to the European capitals, and who in 1905 surprised the world by granting a legislative assembly and a constitution to his people. He died in January, 1907, and was succeeded by his son Mohammed Ali Mirza. The new Shah rebelled against constitutional restrictions and in 1908 dispersed the assembly, an act that was followed by a revolution, the capture of the capital, February 13, 1909, and the dethronement of the Shah. His son, Ahmed Mirza, 11 years of age, was raised to the throne under a liberal regent. Russia, however, favored the cause of the deposed shah and during the years 1911-12 seriously threatened the freedom of Persia. See *Shuster*.

Language and Literature.— Iranian is the name now usually given to all forms of the Persian language, which belongs to the great Indo-European or Aryan division of languages. The oldest form of the language is called Old Bactrian or Zend. It is that in which the Zend-Avesta (which see) was originally composed, and is very closely allied to the Old Sanskrit of the Vedas. The next development of the Iranian language is the Old Persian of the cuneiform inscriptions of the Achæmenian dynasty. We then lose sight of the Iranian language, and in the inscriptions and coins of the Sassanian kings, and in the translations of the Zenda-Vesta made during the period of their sway in Persia, we find a language called Pehlevi or Pehlvi, which is strictly merely a mode of writing Persian in which the words are partly represented by their Semitic equivalents. This curious disguised language is also known as *Middle Persian*. *New Persian* was the next development, and is represented in its oldest form in the *Shanameh* of Firdusi (about 1000 A. D.). In its later form it is largely mingled with Arab words and phrases, introduced with Mohammedanism after the Arab conquest. The written character is the Arabic, but with four additional letters with three points. The Persians possess rich literary treasures in poetry, history, and geography, but principally in the former. Among the most brilliant of Persian poets are: Rudagi, a lyric and didactic poet (flourished about 952), regarded as the father of modern Persian poetry; the epic poet Firdusi (beginning of 11th century), whose most celebrated work is the poetical history of the *Shanameh* ('Book of Kings') in 6000 couplets; Omar Khayyam (died 1123), the author of the celebrated *Quatrains;* Nisâmi (12th century), a didactic poet; Sadi (13th century), a lyric and moral poet, author of the *Gulistan* or *Rose Garden*, a collection of stories; Rumi, his con-

temporary, a great mystic and didactic writer, etc.; Hafiz (born about the beginning of the 14th century), the most celebrated writer of odes; Jami (15th century), one of the most productive and most captivating of Persian poets. (See the different articles.) In the 16th century literary production almost ceased. The Persians are remarkable as being the only Mohammedan nation which has cultivated the drama. Their productions in this province of literature closely resemble the mysteries of the middle ages, and abound in natural and affecting lyrical passages. Not less numerous are the prose fables, tales, and narratives, many of which have been translated into English, French, German, and other European languages. It was also through the Persian that much of the Indian literature in fables and tales was transmitted to the Arabs, and thence to Europe. In the departments of history, geography, and statistics the Persians have some large and valuable works. Tabari is the earliest historian (died 922 A. D.). Mirkhond, who flourished in the 15th century, wrote a voluminous work on the *History of Persia* down to 1471. Geometry and astronomy were also cultivated with ardor by the Persians, but their knowledge on these subjects was in a great measure borrowed from the Arabians. Religious works are also numerous; besides those treating of Mohammed and Mohammedan religion, they have translations of the Pentateuch and the Gospels. The Persians have also translated many works belonging to old Indian literature, among others the epics *Ramayana* and *Mahabharata*, besides the abridgment of the *Vedas*. They have also paid great attention to their own language, as the number of lexicographical and grammatical works testify. Among the most important modern works are the journals of Nasiru 'ddin Shah, composed in colloquial Persian, and the writings of the religious leaders.

Persian Gulf, a gulf separating Persia from Arabia, and communicating with the Indian Ocean by the Strait of Ormuz, 35 miles wide; greatest length, 560 miles; medium breadth, 180 miles. It receives the waters of the united Euphrates and Tigris, and of a number of small streams; the principal port is Bushire. There are many islands in the gulf; the largest are: Kishim, Ormuz, and the Bahrein Isles; in the neighborhood of the latter there are lucrative pearl-fisheries.

Persian Powder, an efficacious insecticide introduced from the East, and prepared from the flowers of the *Pyrethrum carneum* or *roseum* (feverfew genus), nat. order Compositæ, a native of the Caucasus, Persia, etc.

Persian Wheel, or NORIA, the *Puisaro* of the south of France, a machine for raising water to irrigate gardens, meadows, etc., employed from time immemorial in Asia and Africa, and introduced by the Saracens into Spain and other European countries. It consists of a double water-wheel, with float-boards on one side and a series of buckets on the other, which are movable about an axis above their center of gravity. The wheel is placed in a stream, the water turns it, and the filled buckets ascend; when they reach the highest point, their lower ends strike against a fixed obstacle, and the water is discharged into a reservoir. In Portugal, Spain, Southern France, and Italy, this contrivance is extensively used; and has been modified to enable it to draw water also from ponds and wells, animals supplying the motive power, and pots, leather, or other bags taking the place of buckets.

Persigny (per-sēn-yē), JEAN GILBERT VICTOR FIALIN, DUC DE, a French statesman, born in 1808; died in 1872. In youth a royalist, in the army a republican, he finally became one of the staunchest and most active supporters of Napoleon III. He instigated and took part in the military rising at Strasburg in 1836, and was arrested, but escaped. In 1840 he shared Napoleon's expedition to Boulogne, was again captured, and for a time kept in confinement. On the outbreak of the revolution of February, 1848, he hastened to Paris, contributed largely to determine the vote by which Napoleon was elected president (December 10, 1849), and was also one of the most prominent actors in the *coup d'état* (December 2, 1851), by which Napoleon made himself emperor. He held the office of minister of the interior from 1852–54, and again from 1860–63; was appointed member of the senate in 1852; ambassador to Great Britain in 1855. He was elevated to the rank of duke in 1863.

Persimmon (pėr-sim'un), the fruit of the *Diospyros virginiāna*, a tree (a species of ebony) native to the United States, more especially the Southern States, where it attains the height of 60 feet or more. The fruit is succulent, reddish, and about the size of a small plum, containing a few oval stones. It is powerfully astringent when green, but when fully ripe the pulp becomes soft, palatable, and very sweet. There are species also in Africa and

Europe, and a Japanese species, the fruit of which is larger than that of the American persimmon.

Persistence (pėr-sis'tens), in physics, the continuance of an effect after the cause which first gave rise to it is removed; as, the *persistence* of the impression of light on the retina after the luminous object is withdrawn; the *persistence* of the motion of an object after the moving force is withdrawn.

Persius (per'she-us), full name AULUS PERSIUS FLACCUS, a Roman satirical poet, was born A. D. 34 at Volterra in Etruria, and died in 62. He was well connected; was on friendly terms with some of the most eminent men of the time, and much beloved for the purity and amenity of his manners. Six satires by him have been preserved; they are distinguished for vigor, conciseness, and austerity of tone. Dryden and Gifford, among others, have translated them into English.

Personal Actions, in law, are actions brought for the specific recovery of goods and chattels, or for the redress of breaches of contract or other injuries, in contradistinction to *real actions*, brought for the recovery of lands, tenements, and other heritable property.

Personalty, or PERSONAL PROPERTY, movables; chattels; things belonging to the person, as money, jewels, furniture, etc., as distinguished from *real* estate in lands and houses. In the United States and England the distinction between *real* and *personal* property is very nearly the same as the distinction between *heritable* and *movable* property in the law of Scotland.

Personation. See *False Personation.*

Personification (pėr-son-i-fi-kā'-shun), in the fine arts, poetry, and rhetoric, the representation of an inanimate subject as a person. This may be done in poetry and rhetoric either by giving epithets to inanimate subjects which properly belong only to persons, or by representing them as actually performing the part of animated beings.

Perspective (pėr-spek'tiv), the art or science which teaches how to produce the representation of objects on a flat surface so as to affect the eye in the same manner as the object or objects themselves when viewed from a given point. Perspective is intimately connected with the arts of design, and is particularly necessary in the art of painting, as without correctness of perspective no picture can be entirely satisfactory. Perspective alone enables us to represent foreshortenings (see *Foreshortening*) with accuracy, and it is requisite in delineating even the simplest positions of objects. That part of perspective which relates to the form of the objects differs essentially from that which teaches the gradation of colors according to the relative distance of objects. Hence perspective is divided into *mathematical* or *linear perspective*, and the perspective of color or *aerial perspective*. The contour of an object drawn upon paper or canvas represents nothing more than such an intersection of the rays of light sent from the extremities of it to the eye, as would arise on a glass put in the place of the paper or canvas. Suppose a spectator to be looking through a glass window at a prospect without, he will perceive the shape, size, and situation of every object visible upon the glass. If the objects are near the window the spaces they occupy on the glass will be larger than those occupied by similar objects at a greater distance; if they are parallel to the window, their shapes upon the glass will be parallel likewise; if they are oblique, their shapes will be oblique; and so on. As the person alters his position, the situation of the objects upon the window will be altered also. The horizontal line, or line corresponding with the horizon, will in every situation of the eye be upon a level with it, that is, will seem to be raised as far above the ground upon which the spectator stands as his eye is. Now suppose the person at the window, keeping his head steady, draws the figure of an object seen through it upon the glass with a pencil, as if the point of a pencil touched the object, he would then have a true representation of the object in perspective as it appears to his eye. Representations of objects have, however, generally to be drawn on opaque planes, and for this purpose rules must be deduced from optics and geometry, and the application of these rules constitutes what is properly called the art of perspective. Linear perspective includes the various kinds of *projections*. *Scenographic* projection represents objects as they actually appear to the eye at limited distances. *Orthographic* projections represent objects as they would appear to the eye at an infinite distance, the rays which proceed from them being parallel instead of converging. It is the method on which plans and sections are drawn. A *bird's-eye view* is a scenographic or orthographic projection taken from an elevated point in the air from which the eye is supposed to look down

upon the objects. *Aerial perspective* teaches how to judge of the degree of light which objects reflect in proportion to their distance, and of the gradation of their tints in proportion to the intervening air. By its application each object in a picture receives that degree of color and light which belongs to its distance from the spectator. The charm and harmony of a picture, particularly of a landscape, depend greatly upon correct aerial perspective.

Perspiration (pėr-spi-rā′shun), or SWEAT, the fluid secretion of special glands, the *sudoriparous* or *sweat glands* of the skin. The term perspiration is, however, sometimes used to include all the secretions of the skin, such as those of the sebaceous glands or follicles, etc. The sweat-glands, situated in the subcutaneous adipose or fat tissue of the skin, consist of a coiled-up tube, invested by a capillary network of blood-vessels, and continued to the surface of the skin, where it opens in an oblique valvular aperture. The openings of the sweat-ducts constitute the popular 'pores' of the skin. The largest and most numerous ducts are situated in the palm of the hand (Krause estimates 2736 to the square inch, Erasmus Wilson 3528). Perspiration is divided into *insensible* and *sensible*, the former being separated in the form of an invisible vapor, the latter so as to become visible by condensation in the form of little drops adhering to the skin. Water, fatty acids, carbonic acid, salts, etc., are removed from the body by the sweat, by which also the skin is kept moist. By the passing off of the sweat as vapor, heat is lost from the body, and thus the greater or less activity of the sweat glands plays an important part in regulating the bodily temperature. For these reasons the regular process of perspiration is necessary for the preservation of good health. The constituents of sweat are to some extent dependent on the various bodily conditions and circumstances, hence the various results of analysis by different authorities. The quantity of sweat evolved from the skin has been estimated at nearly two pounds daily.

Perth (perth), a city of Scotland, capital of the county of the same name, on the right bank of the Tay. The North and South Inches, two fine public parks, extend along the river bank, and a bridge of nine arches leads to the suburb of Bridgend. St. John's Church, a Gothic building partly ancient, the Episcopal cathedral, the County Buildings, the municipal buildings, and the railway-station, the largest in Scotland, deserve special mention. Perth is celebrated for its bleachfields and dye-works. It manufactures cotton goods, ginghams, winceys, plaids, table-linen, carriages, castings, etc. The river is navigable to the city for small vessels.— Perth is generally supposed to be of Roman origin. Its earliest known charter is dated 1106; but it was first erected into a royal burgh in 1210 by William the Lion. Till the death of James I, in 1437, it was the capital of Scotland, and both then and subsequently it became the scene of some of the most remarkable events in Scottish history. Pop. 33,566.— The COUNTY, which occupies the center of Scotland, has an extreme length, east to west, of 63 miles; breadth, north to south, 60 miles; area, 12,528 sq. miles. The Grampians, which occupy the N. and N.W. of the county, culminate in several high peaks, including Benlawers (3984 feet), and the Ochil and Sidlaw ranges occupy the S.E. The principal river is the Tay, the basin of which comprises nearly the whole county. The chief lakes are Loch Tay, a magnificent expanse of water, 16 miles long; Loch Ericht, Loch Rannoch, and Loch Katrine. Sheep farming is extensively carried on. The salmon fisheries of the Tay are very valuable. The principal towns of the county are Perth, Blairgowrie, Crieff, and Dunblane. Pop. 123,260.

Perth, capital of Western Australia, on the Swan River, 12 miles above its port, Freemantle (at the mouth of the Swan River). It was founded with the Swan River Settlement in 1829, is well laid out, with broad streets, and has some good buildings. Pop. 36,199.

Perth Amboy, a city and port of Middlesex Co., New Jersey, on Raritan Bay, 21 miles S. W. of New York; has a good harbor. Here are large deposits of fire-clay and kaolin, and fine bricks of the best quality are made. It has other industries of importance, including smelting, refining and chemical works, iron foundries, etc. Pop. 32,121.

Perthes (per′tās), FRIEDERICH CHRISTOPH, a German publisher, born in 1772; died in 1843. After carrying on business in Hamburg for a number of years, in 1821 he removed to Gotha and founded there a prosperous publishing business, chiefly of historical and theological literature. An uncle of his, J. G. Justus Perthes, was the founder of the firm Justus Perthes of Gotha, celebrated as the publishers of the famous geographical work *Petermanns Mitteilungen*, and of the *Almanach de Gotha*.

Pertinax (pėr'ti-naks), PUBLIUS HELVIUS, a Roman emperor, born in 126 A. D., the son of a freedman. He distinguished himself in the army, and attracted the attention of Marcus Aurelius, who elevated him to the consulate in 179. During the reign of Commodus, Pertinax was employed in Britain and Africa, and finally made prefect of Rome. After the murder of Commodus he was proclaimed emperor in 193, but in three months was murdered by the prætorian guards.

Perturbations (pėr-tur-bā'shunz), the orbital irregularities or deviations of the planets from their regular elliptic orbits. These deviations arise, in the case of the primary planets, from the mutual gravitations of these planets towards each other, which derange their elliptic motions around the sun; and in that of the secondaries, partly from the mutual gravitation of the secondaries of the same system, similarly deranging their elliptic motions around their primary, and partly from the unequal attraction of the sun on them and on their primary.

Peru (pē'rö), a city of Lasalle Co., Illinois, on the Illinois River, 100 miles W.S.W. of Chicago. The Illinois and Michigan Canal begins here and the river is navigable to this point. There are large zinc works and other manufactures, and coal is extensively mined. Pop. 7984.

Peru, a city, capital of Miami Co., Indiana, on the Wabash River, 67 miles N. of Indianapolis. It has car-shops, cabinet works, steel-works, and also makes electrical appliances, refrigerators, baskets, etc. Pop. 10,910.

Peru (pē-rö'), a republic of South America, bounded on the north by Ecuador, on the west by the Pacific Ocean, on the south by Chile, and on the east by Bolivia and Brazil; area, 405,040 sq. miles; pop. estimated at 4,500,000. The population consists of about 57 per cent. aboriginal Indians, 23 per cent. mixed Indian races, and 20 per cent. of descendants of Spaniards, Europeans (chiefly Italians, French, and Spaniards), and Asiatics (chiefly Chinese). Principal towns: Lima, the capital; Arequipa, Cuzco, and Truxillo; principal ports, Callao (port of Lima), Mollendo (port of Arequipa), and Truxillo.

Physical Features.— This country exhibits great varieties of physical character. It is traversed throughout its length by the Andes, running parallel to and on an average 60 miles distant from the coast, the region between largely consisting of sandy desert, except where watered by transverse mountain streams. The Andes consist here of two main chains or Cordilleras, connected by cross ranges, inclosing extensive and lofty valleys and plateaus. The Andes region is roughly estimated at about two-fifths of the entire area of Peru. The loftiest summits are in the southern portion of the W. Cordillera; several peaks attain there an altitude of 20,000 feet or more. The country east of the Cordilleras, forming a part of the Amazon basin, and mostly covered by dense forest, is but little known and almost exclusively in possession of the native Indians. It is called Montaña or Los Bosques. The elevated region between the gigantic ridges of the E. and W. Cordilleras, called Las Sierras, is now the chief, as it was anciently almost the exclusive seat, of the population of Peru. It is partly occupied by mountains and naked rocks, partly by table-lands yielding short grass, and extensive hilly pasture grounds, and partly by large and fertile valleys. The most important districts are those of Pasco, of Cuzco, the valleys of the Rio Jauja, and of the Marañon or Amazon. The first of these lies at one of those points where the branches of the Andes unite, the ridges sinking into an elevated plain, which has here a general height of 14,000 feet. The veins of the precious metals, with which this region abounds, have attracted to it a comparatively dense population. The table-land of Cuzco descends from an elevation of less than 12,000 feet in the S. to about 8000 feet in the N. Of the lakes Lake Titicaca (12,542 feet above sea-level), the largest in South America, and which partly belongs to Bolivia, is the only one of commercial importance. The chief rivers are the Marañon or main stream of the Amazon, and the Huallaga and Ucayale, which join the Marañon; the Ucayale, formed by the united waters of a number of streams (Apurimac, Urubamba, Paucartambo), being about the same size as that river. In the maritime region of Peru earthquake shocks are of common occurrence, and some of them have been of exceptional severity, the most disastrous being those of 1746, 1868, and 1877. Gold and silver occur in all the provinces of Peru, and form the chief wealth of the country. Quicksilver is also abundant. Copper, lead, and iron also exist in various places.

Climate.— The climate of Peru is as varied as its physical aspect. On a portion of the coast no rain has fallen within the memory of man, but the *garua*, a thick heavy mist often accompanied by drizzling rain, is a partial

compensation, and the rivers from the Andes afford means of irrigation for sugar and cotton plantations. From November to April the sky is cloudless, and were it not for the cool oceanic currents, and the streams of cold air from the snowy Andes, the heat would be unbearable. Fortunately the rainy season in the mountains corresponds with this period. The central plateau region has a mild and comparatively humid climate, but the higher regions are inclement and subject to terrific tempests. East of the Andes the regular equatorial winds from the east come loaded with humidity, and, checked by the mountains, pour down copious, and in some places almost perpetual, rains.

Plants and Animals.— Peru is exceedingly rich in botany, each region having its own flora. In the less elevated portions of the Eastern Andes a tropical vegetation is found; while on the higher parts representatives of Alpine families (as the gentians) luxuriate. In the forests of Eastern Peru cinchona trees grow abundantly and supply the valuable bark from which the quinine is extracted. The same zone, especially the hot plains and swamps, also supply coca, the medicinal properties of which have for centuries been known to the natives of Peru and Bolivia, who chew the leaves as a stimulant. Tobacco, cotton, sugar, rice, coffee, coca, and maize are grown in various parts and in increasing quantities. The eastern face of the Andes is as remarkable for its fauna as it is for its flora. The forests on the lower ranges and in the plains swarm with many species of parrots and monkeys; the tapir, sloth, ant-eater, armadillo, etc., are found here; the rivers are alive with alligators; and in the inundated plains the boa-constrictor attains a huge size. The puma and the South American bear inhabit the higher levels; the llama, the guanaco, the alpaca, and the vicuña, the still more elevated regions.

Commerce.— Peru exports precious metals, silver ores, guano, cubic nitre, wool of the llama, alpaca, and vicuña, cotton, sugar, cinchona bark, coca leaves and cocaine, chinchilla skins, and hides. The chief imports are machinery, cotton, woolen, and linen goods, and provisions. The trade of the country has suffered much from revolutions, and more from the disastrous war with Chile (1879–83). The export of guano and cubic nitre has naturally declined since the Chileans possessed themselves of the guano deposits of the Lobos Islands, and of the province of Tarapacá, which contains the richest nitrate beds. The foreign trade is chiefly carried on with Great Britain and Germany. The internal trade of the country has been fostered by the construction of railways, one of which attains a height of 15,600 feet in its passage through the Andes, and exhibits remarkable engineering works. Some 2000 miles have been constructed at a cost of about $170,000,000, but only about 1500 miles are in working order.

Government, etc.— The government is based on a constitution adopted in 1867, and modeled on that of the United States. The legislative power is in the hands of a senate and a house of representatives, the senate being composed of two senators for each province, and the house of representatives containing one member for every 20,000 of the population. The president, elected for four years, is the executive. Peru has a foreign debt (chiefly contracted in England) amounting to $157,000,000, including unpaid interest since 1876. In 1890 this debt was settled by transfer of all the railways of the State to the bondholders. There is besides an internal debt of $20,000,000. The annual revenue amounts to about $15,000,000. In Peru the Indian is on a level in political rights with the white man; there exists absolute political but not religious freedom, the constitution prohibiting the exercise of any other religion than the Roman Catholic. There is, however, a considerable amount of tolerance. Education is compulsory and free; there are universities at Lima, Arequipa, and Cuzco. The Peruvian language, of which there are many dialects, still maintains itself alongside of the language of the conquerors.

History.— Of the early history of Peru we are almost entirely ignorant, but existing ruins, spoils secured by the Spaniards, and the description left us by the historians of the Spanish conquest, sufficiently prove that the ancient Peruvians had no mean knowledge of architecture, sculpture, metal work, etc. They also had made considerable progress in astronomical science. The early religion of the Peruvians is bound up in the god Viracocha, the creator of the sun and the stars, and from him the Incas or emperors claimed descent as the sons of the sun. Under the Incas the empire was divided into four parts, corresponding to the four cardinal points; each division had a separate government, presided over by a viceroy of royal blood. All the land belonged to the Inca, and trade was carried on by barter, money being unknown. The thirteenth monarch of the Incas was reigning when the Spanish adventurer, Pizarro, disembarked

in Peru in 1531. The Inca was taken prisoner (1532), numbers of his subjects were massacred, and the whole country fell in a short time into the hands of the invaders. It was then formed into a Spanish viceroyalty; subsequently part of it was incorporated in New Granada, and the viceroyalty of Buenos Ayres was constructed out of some of the provinces. In 1821 the country proclaimed its independence, but did not obtain actual freedom from Spanish rule until 1824, after a prolonged war. Since then Peru, like the rest of the South American republics, has suffered much from dissensions and revolutions. In the spring of 1879 it joined Bolivia in a war against Chile, resulting in the complete defeat of both the former. Peru had to cede by the peace of 1883 the province of Tarapacá, while Chile also got possession of the department of Tacna for ten years, when the inhabitants were to decide by vote whether they would remain under Chilean rule. No vote has been taken and Chile remains in possession.

Peru Balsam, a resinous product obtained from certain species of *Myroxylum*, order Leguminosæ, natives of tropical America, used in medicine and perfumery. The *white Peru balsam*, a pale-yellow, transparent, and sirupy liquid, is produced from the inner coating and seed of the fruit; it hardens and becomes reddish on exposure to air, and is then called *dry, brown*, or *red Peru balsam*. By boiling the bark and twigs of the tree a dark-brown sirup, of vanilla-like odor, sharp and bitter taste, is obtained, the *black Peru balsam* of commerce.

Perugia (pā-rö′jȧ; ancient *Perusia*), a town of Central Italy, capital of the province of the same name, 84 miles north of Rome. It is beautifully situated on an eminence above the Tiber, has irregular but spacious streets, and is surrounded by old walls. It is rich in art and literary treasures, and has many remarkable buildings, including a Gothic cathedral of the 15th century, a number of churches and monasteries, a town-hall (Italian-Gothic, begun 1281), and a university, founded in 1307. The manufactures, not of much consequence, consist of velvet, silk stuffs, etc. Perugia was an old Etruscan city, and was conquered by Rome in 310 B. C. Pop. 22,321.— The province of Perugia has an area of 3719 English square miles, and is very fertile. It is traversed in all directions by offsets of the Apennines. The principal stream is the Tiber. Pop. 675,352.

Perugia, Lago di, or **Lago Trasimeno** (ancient, *Trasimēnus Lacus*), a lake in Italy, 9 miles west of Perugia, about 8 miles long, varying in breadth from 7 miles to 4 miles, surrounded with olive plantations. It contains three islands, and abounds in fish. It has no visible outlet.

Perugino (per-u̇-jē′nō), **Pietro Vanucci**, surnamed *Il Perugino*, the founder of the Roman school of painting, born at Città della Pieve (a dependency of Perugia) in 1446; died at Fontignano in 1523. He spent his youth, learnt his art, and lived much at Perugia (whence his surname), and at an early age distinguished himself by his works. His easel pictures were done in his earlier practice in tempera, but he afterwards became a master in the oil method. About 1480 Pope Sixtus IV sent for him to Rome, where he was employed along with Signorelli, Ghirlandaio, Botticelli, and Rosselli in decorating the Sixtine Chapel with frescoes. Fine specimens of his frescoes are preserved in Perugia, Rome, Bologna, and Florence, and specimens of his other works are not infrequent in European galleries. Raphael is his most celebrated disciple.

Peruke. See *Wig*.

Peruvian Bark. See *Bark, Peruvian*.

Peruzzi (pā-ru̇t′sē), **Baldassari**, architect and painter of the Roman school, born at Siena in 1481; died at Rome in 1537. He went early to Rome and was employed in the decoration of various churches. He designed the Farnesina Villa on the banks of the Tiber, and he succeeded Raphael as architect of St. Peter's. After the sack of Rome by the army of Constable Bourbon he returned to Siena, where he was made city architect. In 1535 he was again in Rome, and thenceforward devoted himself entirely to architecture. His best existing works in fresco are at Siena.

Pesaro (pā′zȧ-rō; ancient, *Pisaurum*), a fortified town and seaport of Italy, province of Pesaro e Urbino, near the mouth of the Foglia, in the Adriatic. It is the see of a bishop. The harbor, formed by the mouth of the Foglia, has become shallow; but the trade in the wine, fruit (particularly figs), oil, silk, and other products of the district is considerable. The illustrious composer Rossini was born here in 1792. Pop. of town, 14,768.— The province of Pesaro e Urbino has an area of 1144 square miles. Pop. 235,982.

Peschiera (pes-ki-ā′rȧ), a town and fortress of Italy, 20 miles northwest of Mantua, one of the four strongholds which form the famous 'Quadrilateral.' Pop. 2962.

Peseta (pe-sā′ta), the Spanish money unit, equivalent to a franc.

Peshawar (pā-shä′wur), a town of India, in the Punjab, capital of the division of the same name, 12 miles east of the eastern extremity of the Khyber Pass. It covers a large area, is surrounded by a mud wall, and commanded by the Bala Hissar, a fort which crowns an eminence just outside the walls. It has several good mosques, but few architectural attractions. It is favorably situated for commerce, lying in the great route from Bokhara and Cabul to India, and its proximity to the Khyber Pass makes it an important strategical point of British India, hence a British garrison is stationed here. The population, including the military cantonment 2 miles W. of the city proper, is 95,147. The cantonment accommodates a large force, the population in it being about 20,000. The division or commissionership comprises the districts of Peshawar, Hazara, and Kohat, with the control of part of the hill tribes inhabiting the Khyber Pass. Area, 8381 square miles.

Peshito (pe-shē′tō), or PESHITTO (that is, 'simple,' 'true,' or according to some, 'explained'), is the name given to a Syriac translation of the Old and New Testaments. Neither the time of its appearance nor its authorship are positively known. It is extremely faithful, and possesses high authority, especially in regard to the New Testament, of which it is probably the first translation that was made. Four of the catholic epistles and the Revelation of St. John are wanting.

Peso (pā′sō), a silver coin and money of account which is used in Mexico and other parts of Spanish America. It is often considered equivalent to a dollar.

Pessimism (pes′i-mizm), a modern term to denote the opinion or doctrine that maintains the most unfavorable view of everything in nature, and that the present state of things only tends to evil; that in human existence there is an enormous surplus of pain over pleasure, and that humanity can find real good only by abnegation and self-sacrifice. It is antithetical to *optimism*, and as a speculative theory is the work of Schopenhauer and Von Hartmann, though it is preluded in the metaphysics of Brahmanism and the philosophy of Buddhism.

Petalouma (pet-a-lö′ma), a city in Sonoma county, California, 42 miles W. by N. of San Francisco. It has manufacturing and shipping interests. Pop. 5880.

Pestalozzi (pes-ta-lot′sē), JOHANN HEINRICH, a Swiss philanthropist and educational reformer, born in 1746; died in 1827. He first studied theology, then law, and subsequently became concerned in a calico manufactory. Afterwards he devoted his time and substance to the children of paupers, whom he collected in large numbers in his own house, and this good work he carried on for over twenty years without outside aid or even sympathy. The want of means at last compelled him to abandon his gratuitous institution, and to seek pupils who could pay for their maintenance and instruction. After a few years of successful teaching in various places he opened a school in the Castle of Yverdun (canton Vaud), which the government had placed at his disposal. His novel *Lienhardt and Gertrud* (1781–89, 4 vols.) exerted a powerful moral influence, while his educational treatises have laid the foundation for the more rational system of elementary instruction which now obtains in Europe. The grand principle that lay at the basis of Pestalozzi's method was that of communicating all instruction by direct appeal to the senses and the understanding, and forming the child by constantly calling all his powers into exercise, instead of making him a mere passive recipient, selecting the subjects of study so that each step should best aid the progress of the pupil.

Pesth, or PEST. See *Budapest.*

Pestilence. See *Plague.*

Petal (pet′al), an appellation given to the leaves of the corolla of plants, in distinction from those of the calyx, called *sepals.*

Petalite (pet′a-līt), a rare mineral, a silicate of aluminum and lithium, containing from 5 to 6 per cent. of the latter. It occurs in masses of foliated structure; color white, occasionally tinged with red, green, or blue.

Petard (pē-tard′), a bell-shaped machine of gun-metal, and loaded with from 9 to 20 lbs. of powder. It was formerly employed to break down gates, bridges, barriers, etc., by its explosion.

Petau′rus. See *Flying-phalanger.*

Petchora (pet-chō′ra), a river of Russia, rises in the north of the government of Perm, on the western slope of the Ural Mountains, and

after a course of about 900 miles falls into a bay of the Arctic Ocean by a number of mouths.

Petechiæ (pe-tek'i-ē), in medicine, a name for purple or crimson spots which appear on the skin in certain diseases.

Peter (pē'tẽr), THE APOSTLE, commonly called Saint Peter, was a Galilean fisherman from Bethsaida, originally named Simon, the son of Jona, and brother of St. Andrew, who conducted him to Christ. Jesus greeted Simon with the significant words, 'Thou art Simon the son of Jona; thou shalt be called Cephas' (in Greek *Petros*, a stone, whence the name Peter). After the miraculous draught of fishes Peter became a regular and intimate disciple of our Lord. The impetuosity of his character led Peter, especially in the early days of his apostleship, to commit many faults which drew upon him the rebuke of his divine Master. His zeal and eloquence made him often the speaker in behalf of his fellow-apostles on important occasions, and his opinions had great influence in the Christian churches. On one memorable occasion he incurred the rebuke of the apostle Paul in consequence of his behavior towards the Gentile Christians in regard to social intercourse. Nothing certain is known of his subsequent life, but it is almost beyond doubt that he was a joint-founder of the church at Rome, and that he suffered martyrdom there, most likely under Nero, about 64 A. D. The only written documents left by Peter are his two *Epistles*. The genuineness of the *First Epistle* is placed beyond all reasonable doubt, both the external and internal evidence being of the strongest description; that of the *Second Epistle*, however, has been disputed by numerous critics on what appears to be plausible grounds. Doubts of its genuineness already existed in the time of Eusebius, and it was not admitted into the New Testament canon till 393 A. D.

Peter THE CRUEL, King of Castile and Leon, born 1334, succeeded his father Alfonso XI in 1350, and died in 1369. His reign was one long series of cruelties and despotic acts. The year following his coronation he put to death Eleanora de Guzman, his father's mistress. In 1353 he married, though contrary to his will, Blanche of Bourbon, one of the most accomplished princesses of the time, whom, however, he abandoned two days after his marriage in order to rejoin his mistress, Maria Padilla. The queen was imprisoned and divorced, and his mistress's relations appointed to the highest offices. He then married the beautiful Juana de Castro, but only to abandon her after a few months. Two revolts against him were unsuccessful. On the second occasion, however, in 1366, Peter fled, and was dethroned, but he was reinstated in 1367 by an English army led by Edward the Black Prince. Executions and confiscations naturally followed, but these fresh cruelties only helped to swell the ranks of his opponents, of whom the chief was his half-brother, Henry of Transtamara. In 1369 Henry gained a signal victory over Peter at Montiel, and the latter was slain in a sword combat with his brother.

Peter THE HERMIT, an enthusiastic monk of Amiens, whose preaching, after a pilgrimage to Jerusalem (end of the eleventh century), gave rise to the first Crusade. (See *Crusades*.) Peter led the way through Hungary at the head of an undisciplined multitude of nearly 100,000 men, a comparatively small number of whom survived to reach their destination, and distinguished himself by his personal courage at the storming of the holy city. On his return to his native country he founded the abbey of Noirmoutier, and died its first superior in 1115.

Peter I (THE GREAT), ALEXEIEVITCH, Emperor of Russia, born in 1672, was the eldest son by his second wife of the Czar Alexis Mikhailovitch. His elder brothers, Fedor and Ivan, were

Peter the Great.

feeble in constitution. Fedor succeeded his father in 1676, and died in 1682. Ivan renounced the crown, and Peter was declared czar, with his mother, the Czarina Natalia Kirilovna, as regent.

PETER THE HERMIT, IN THE PRESENCE OF POPE URBAN II., PREACHING THE FIRST CRUSADE AT CLERMONT, IN AUVERGNE, "DEUS VULT, DEUS VULT."

Sophia, third daughter of Alexis, ambitious to govern, succeeded in having Ivan proclaimed czar jointly with Peter, and herself regent. Peter was relegated to private life, his education purposely neglected, and his bad habits encouraged. In 1689 he wrested the power from his sister, and confined her in a convent. Peter was now virtually sole emperor, though, till the death of his brother in 1697, he associated his name with his own in the ukases of the empire. He now determined to do what he could to raise his country out of its barbarism, and to place its people in the ranks of civilized nations. His journey to Holland and England (1697–98), when he worked as an artisan in shipyards, is familiar; and the knowledge he there gained was amply profited by on his return. Peter, however, not only created a navy, but gave Russia a seaboard and seaports by wresting the Baltic provinces from Charles XII of Sweden. Young Russian nobles were obliged to travel; schools of navigation and mathematics were founded; agriculture was improved by the introduction of implements, seeds, and superior breeds of cattle. Peter imported foreign artisans of all kinds, established manufactories of arms, tools, and fabrics, and distributed metallurgists through the mining districts of Russia; roads and canals were made to foster internal commerce, and to extend trade with Asia. In 1703 he laid the foundation of St. Petersburg, and twenty years later of its Academy of Sciences. Laws and institutions which in any way interfered with his projects he either abolished or altered. In his zeal to do good he was too frequently injudicious in choosing times and seasons, and the least show of opposition irritated him into ferocity. He repudiated his wife a few years after marriage for her reactionary leanings; for the same reason his son Alexis was ill treated, compelled to renounce the succession, and condemned to death, but died suddenly before sentence could be carried out. Peter died January 28, 1725, the immediate cause being inflammation, contracted while assisting in the rescue of some soldiers in Lake Ladoga. In 1707 he had married his mistress Catharine; this marriage was publicly celebrated in 1712; Catharine was crowned in 1724, and succeeded Peter after his death. See *Catharine I.*

Peter II, Alexeievitch, Emperor of Russia, grandson of Peter the Great and son of Alexis, ascended the throne in consequence of the will of Catharine I, in 1727, when but thirteen years old. He died in 1730 of the smallpox, and was succeeded by Anna Ivanovna.

Peter III, Feodorovitch, Emperor of Russia, born in 1728, was the son of Anna Petrovna, daughter of Peter the Great, and the Duke of Holstein. Peter III ascended the throne in January, 1762, but on account of his German proclivities and other causes a conspiracy broke out in July of the same year. He abdicated on the 10th, and was murdered on the 17th of the same month. See *Catharine II.*

Peterborough (pē′ter-bur-o), an episcopal city and parliamentary borough of England, partly in Huntingdonshire, but chiefly in county Northampton, on the left bank of the Nen, 76 miles N. of London. It is an important railway and agricultural center. The principal building is its cathedral, originally founded in 655, destroyed by the Danes in 870; rebuilt in 966, and again partly destroyed by fire in 1116. It has its present form since the commencement of the sixteenth century. The prevailing character of the building is Norman, but it exhibits examples of the transition, early English, decorated English, and perpendicular styles. Some alterations and restorations have recently been carried out. The bishopric was founded by Henry VIII (1541), and his wife, Catharine of Aragon, was interred in this cathedral. Peterborough received a municipal charter in 1874. Pop. (1911) 33,578.

Peterborough, a flourishing town of Canada, province of Ontario, on the river Otonabee, 26 miles north of Lake Ontario. It is well built; has manufactures of machinery, agricultural implements, etc., and being a railway center has a good trade. Pop. (1911) 18.360.

Peterborough, Charles Mordaunt, Earl of, born about 1658, succeeded his father, Lord Mordaunt, 1675, and his uncle in the earldom of Peterborough, 1697. William of Orange created him Earl of Monmouth, and appointed him first commissioner of the treasury for his services in connection with the dethronement of James II. He eminently distinguished himself in Spain as a commander in the Spanish Succession war, 1705, especially by the capture of Barcelona, and received the thanks of the British parliament. He also held several diplomatic posts; was created a Knight of the Garter in 1713, general of the British marine forces in 1722, and died in 1735 on a voyage to Lisbon.

Peterhead (pē′tėr-hed), a seaport in Scotland, in the county and 26 miles N.N.E. of Aberdeen, on a peninsula, near the most easterly point of Scotland, with a harbor on either side of it, communicating by a cut across the isthmus. The town is substantially built of granite, obtained from quarries in the neighborhood, has several elegant public buildings, and a statue of Field-marshal James Keith, presented by William I, emperor of Germany. It has a good trade, and is an important center of the herring fishery. The Greenland whale and seal fisheries are also important industries. Pop. 11,750.

Peterhof (pē′tėr-hof), a town in Russia, 8 miles W. S. W. of St. Petersburg, celebrated for its imperial summer palace in Versailles style, built in 1711 by Peter the Great. Pop. 11,300.

Petermann (pā′tėr-mȧn), AUGUST, a German geographer, born in 1822; died at Gotha in 1878. His first important work in cartography was a map for Humboldt's *Central Asia.* He afterwards assisted Keith Johnston in the preparation of his *Physical Atlas;* became a member of the Royal Geographical Society, and contributed to the *Encyclopædia Britannica,* etc. In 1854 he became professor of geography at Gotha, and superintendent of Justus Perthes' geographical establishment, editing the *Mitteilungen,* the foremost among geographical magazines.

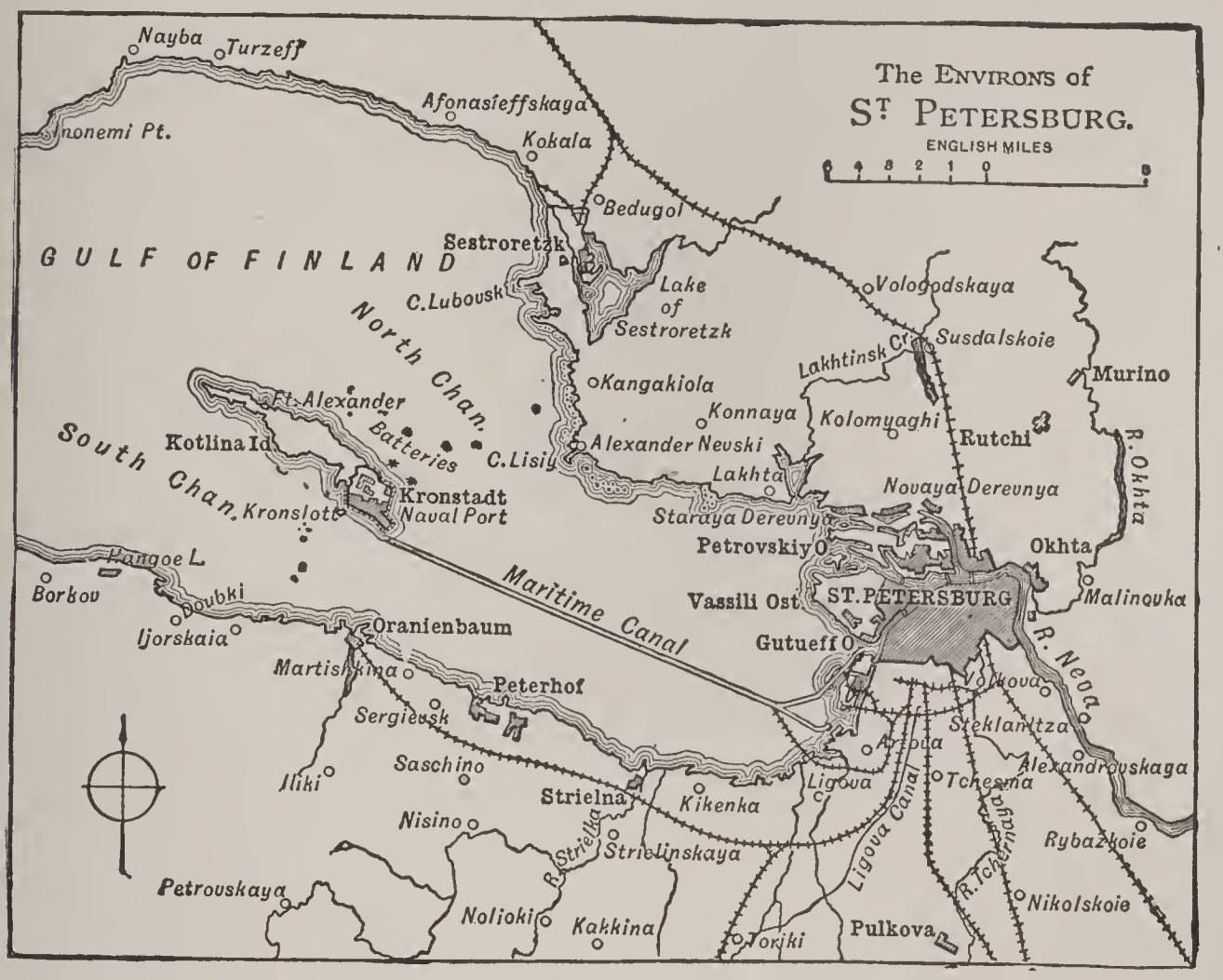
Peter-port, ST., capital of the island of Guernsey, on a bay on the east side, picturesquely situated on the slope of a hill. It has a court-house and prison, a college, and the finest church in the Channel Isles. The environs are exceedingly beautiful. The harbor is large and commodious, and the roadstead affords convenient anchorage. Fort-George, a regular fortification of considerable strength, stands about a half mile south from the town. Pop. about 18,000.

Peter's, SAINT, the Cathedral of Rome, the largest and one of the most magnificent churches in Christendom. It is a cruciform building in the Italian style, surmounted by a lofty dome, built on the legendary site of St. Peter's martyrdom. In 306 Constantine the Great erected on this spot a basilica of great magnificence. In the time of Nicholas V it threatened to fall into ruins, and he determined on its reconstruction, but the work of restoration proceeded slowly, and Julius II (1503–13) decided on the erection of an entirely new building. He laid the foundation-stone of the new cathedral on the 18th of April, 1506, and selected the famous Bramante as his architect. After the latter's death various architects had charge of the work until Michael Angelo was appointed in 1546. He nearly completed the dome and a large portion of the building before his decease (1564). The nave was finished in 1612, the façade and portico in 1614, and the church was dedicated by Urban VIII on November 18, 1626. The extensive colonnade which surrounds the piazza and forms a magnificent approach to the church was begun by Bernini in 1667, and the sacristy erected by Carlo Marchionni in 1780. The interior diameter of the dome is 139 feet, the exterior diameter 195½ feet; its height from the pavement to the base of the lantern 405 feet, to the top of the cross outside 448 feet. The length of the cathedral within the walls is 613½ feet; the height of the nave near the door 152½ feet; the width 87½ feet. The width of the side aisles is 33¾ feet; the entire width of nave and side aisles, including the piers that separate them, 197¾ feet. The height of the baldacchino is 94½ feet. The circumference of the piers which support the dome is 253 feet. The floor of the cathedral covers nearly 5 acres, and its cost is estimated to have exceeded £10,000,000.

Petersburg (pē′terz-burg), a city and river port of Virginia, on the Appomattox River, 23 miles S. of Richmond. It is an important railway center, and a place of considerable trade and manufacturing industry. The falls of the river, just above the city, furnish abundant power to the various mills and factories. This place was besieged by the Federal forces under General Grant in 1864–65, and the capture of this town, 'the last citadel of the Confederacy,' was soon followed by the surrender of General Lee and the end of the Civil war. Pop. 24,127.

Petersburg, ST., the capital and most populous town of the Russian Empire, is built at the mouth of the Neva, a considerable part being on the south or left bank of the river, a small portion on the north bank, and the remainder on the numerous islands formed by the different river mouths; these various sections being connected by bridges. The site is low and marshy, and liable to periodic inundations; it is also unhealthy, the death-rate largely exceeding the birth-rate. The streets are long, wide, and regular, and there are some immense squares; the public buildings are numerous, magnificent, and of colossal proportions; the quays massive

and of granite. The most important quarter is on the south side of the Neva, and is intersected by three main streets which radiate from the Admiralty Place on the river bank. Of these the chief is the Nevskoi Prospekt, a magnificent street, nearly 3 miles long and 130 feet wide. Near the Admiralty are the chief public buildings of the city. The principal churches (which are generally distinguished by prominent cupolas) are St. Isaac's Cathedral, the most costly of all, and one of the largest churches of Europe; the Marble Palace, so-called; the Michael Palace, now used as the School of Military Engineers; and the Hermitage Palace, containing a fine library and one of the richest collections of French, Flemish, Dutch, Italian, Spanish, Russian, and other paintings, the private property of the czars, besides engravings, coins, gems, antiquities, etc. The cottage in which Peter the Great lived while superintending the construction of St. Petersburg is still preserved. Other buildings of importance are: the



rope, modeled on St. Peter's, Rome, built of granite and Finland marble, and with a profusely decorated interior; the cathedral of St. Peter and St. Paul, the resting-place of the emperors, with a conspicuous pyramidal spire (302 feet); the cathedral of Our Lady of Kazan, with an image of the Virgin enriched with precious stones and pearls; the Smolni Cathedral, a white marble edifice; and the Memorial Church, built on the spot where the czar, Alexander II, was assassinated, one of the most splendid of the many sacred edifices in the city. Among the many palaces are, the Winter Palace, now used only for ceremonial purposes, one of the largest and most luxurious in Admiralty, a vast parallelogram of brick, with a naval and natural history museum and library; the arsenal, containing a museum of artillery; the palaces of the general staff and of the senate; the custom-house, the exchange, and imperial bank; the fortress of Petropavlovsk (the Russian bastile); the Academy of Sciences, with extensive museum and library; and the imperial library, with over a million volumes and large collections of manuscripts and engravings. There are numerous hospitals and charitable institutions, a university, founded in 1819, many special academies, and four theaters maintained by the state. Of the monuments, the colossal equestrian

statue of Peter the Great, erected by Catharine II (1782), and the monolithic Doric column of granite, 80 feet high, erected by Nicholas to the memory of Alexander I, take first rank; but these, in common with many of the finest buildings, have severely suffered from climatic influences. St. Petersburg commands a large share of the commerce of the whole empire. Formerly the port of the capital was at the strongly fortified island town of Cronstadt (which see), but large vessels now reach St. Petersburg by means of a deep canal, and commodious harbors have been constructed here. The manufactures are varied, but the principal are glass-works, tanneries, sugar-refineries, cotton-mills, breweries, and tobacco works; also several government establishments besides those connected with military and naval equipment, as a carpet manufactory, modeled on that of the Gobelins at Paris, and a glass and porcelain manufactory. St. Petersburg was founded by Peter the Great in 1703, when he had just wrested its site from the Swedes. The forced construction of a city in a site apparently forbidden by nature cost the lives, according to various accounts, of from 100,000 to 200,000 peasants, collected from all parts of the Russian Empire. It was at first built entirely of wood, and without a proper street system, but the extensive fires of 1736 and 1737 facilitated the reconstruction on an improved plan. The Empress Elizabeth did much to improve the city; it is, however, chiefly indebted to Catharine II for its regularity and architectural splendor; and the improvements under Nicholas and Alexander II have made it one of the finest of European capitals. Pop. (1905) 1,678,000.

Petersfield (pē'terz-fēld), a former parliamentary borough in England, county of Hants, 23 miles E.N.E. of Southampton; with a fine Norman church of the twelfth century. Pop. (1911) 3947.

Peter's Pence, a papal tribute collected in several of the western countries of Europe. The idea of an annual tribute seems to have originated in England before the Norman conquest, and was exacted from every householder about St. Peter's Day for the support of an English college or hospice in Rome. It was finally abolished by Elizabeth. This contribution was sometimes also called *Romescot.* It is still collected among Catholics, especially since the abolition of the Pope's temporal power.

Peterwardein (pā-ter-vär'dīn), a town and fortress of Hungary, on the Danube, opposite Neusatz, 45 miles northwest of Belgrade, the strongest fortress on the Danube. Pop. 5019.

Petiole (pet'i-ōl), in botany, a leaf-stalk; the foot-stalk of a leaf, which connects the blade with the branch or stem.

Pétion de Villeneuve (pā-ti-oṇ dė vēl - n*eu*v), JERÔME, a French revolutionist, originally an advocate at Chartres, where he was born in 1753, was chosen deputy, by the tiers-état of that city, to the states-general in 1789. In October he was made a member of the Committee of Public Safety; elected president of the National Assembly in 1790; appointed president of the criminal tribunal of Paris, and became mayor of Paris in 1791. After the death of the king he was nominated a deputy to the Convention; joined the Girondists; was impeached by Robespierre; escaped from prison, and died, it is supposed, from hunger, his body, in 1794, being found in a field in the department of the Gironde half devoured by wolves.

Petition (pe-tish'un), a representation of grievances with an appeal for redress. The first amendment to the Constitution of the United States provides that Congress shall make no law abridging the right of the people peaceably to assemble, and to petition the government for a redress of grievances. The right of petition has always been treated as an individual right, whereby the citizen can make his grievances known to the highest authority in the State or Union. In the anti-slavery agitation in the United States the right of petition was hotly contested; and it was finally decided that all petitions and memorials touching the abolition of slavery should be laid upon the table without debate. The Bill of Rights, which is a part of all state constitutions, perpetuates the right of petition as a fundamental right incident to the relations between the government and the people. The right of petition is widespread and has been exercised in England from very early times.

Petition of Right, in English history, a parliamentary declaration of the rights and liberties of the people, assented to by Charles I in the beginning of his reign (1628), and considered a constitutional document second in importance only to Magna Charta. The petition demanded:

ALEXANDER COLUMN AND WINTER PALACE, ST. PETERSBURG

(1) that no freeman should be forced to pay any tax, loan, or benevolence, unless in accordance with an act of parliament; (2) that no freeman should be imprisoned contrary to the laws of the land; (3) that soldiers and sailors should not be billeted on private persons; (4) commissions to punish soldiers and sailors by martial law should be abolished.

Petitio Principii (pe-tish'i-o prin-sip'i-ī), in logic, a species of vicious reasoning, which consists in tacitly assuming the proposition to be proved as a premiss of the syllogism by which it is to be proved; in other words, begging the question.

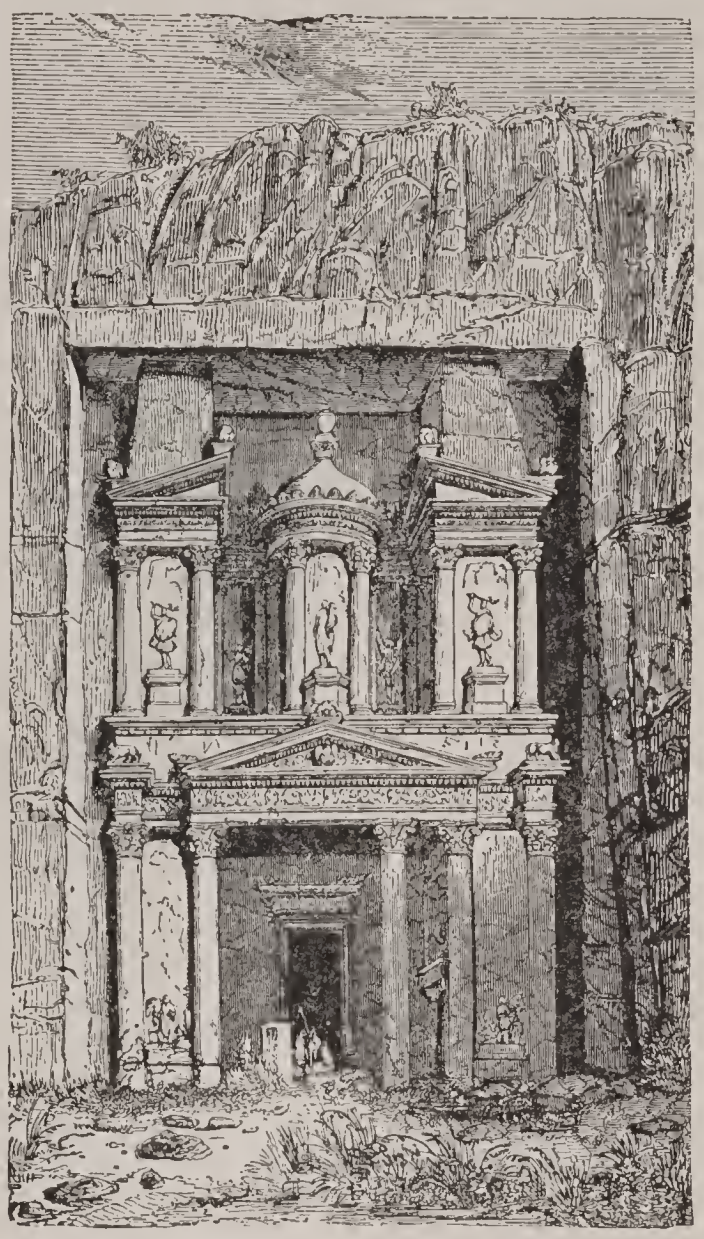
Petit Jury. See *Jury*.

Petöfi (pe-te*u*'fē), SANDER, a Hungarian poet, born in 1823. In his youth he was for some time a common soldier and then a strolling player; in 1843 he contributed to the journals several poems which attracted instant attention; he also wrote several dramas and novels; his lyric of *Most vagy sohā* ('Now or Never') became the war-song (1848) of the revolution; and in recognition of his lyrical fervency he has been named 'the Hungarian Burns.' In the revolutionary war he was an adjutant under Bem. Killed in the battle of Schässburg.

Petoskey (pē-tos'ki), a city of Emmet county, Michigan, on Little Traverse Bay, 60 miles N. N. E. of Traverse City. Lime, lumber, flour, paper, etc., are manufactured, Bear River furnishing much water-power. Pop. 4778.

Petra (pē'trȧ), a ruined city, formerly the Nabathæan capital of Arabia Petræa, in a narrow valley of the Wady Musa, about 110 miles S.S.E. of Jerusalem. It appears to have been a place of considerable extent and great magnificence, for its ruins, partly temples, etc., cut out of the solid rock, cover a large space. It seems to have been the Joktheel of the Old Testament, taken by Amaziah from the Edomites.

Petrarch (pē'trȧrk), FRANCESCO PETRARCA, an Italian poet and scholar, born at Arezzo in 1304. His father being an exile from Florence, his earliest years were spent at Incisa, in the vale of Arno, and afterwards with his father at Carpentras, near Avignon, where he began his education. He afterwards studied law at Montpellier and Bologna, but his own inclinations led him to devote his time to Latin and the Provençal poets. It was at Avignon in 1327 that he first saw, in the church of St. Claire, the Laura who exercised so great an influence on his life and lyrics.



Khasné or Treasury, Petra.

Our information regarding this lady is exceedingly meager, but it is supposed that her name was Laura de Noves, that she had become the wife of Hughes de Sade two years before she was seen by Petrarch, and that she died in 1348 a virtuous wife and the mother of a large family. After this first meeting Petrarch remained at Avignon three years, singing his purely Platonic love, and haunting Laura at church and in her walks. He then left Avignon for Lombez (French department of Gers), where he held a canonry gifted by Pope Benedict XII, and afterwards visited Paris, Brabant, Ghent, the Rhine, etc. In 1337 he returned to Avignon, bought a small estate at Vaucluse, in order to be near Laura, and here for three years wrote numerous sonnets in her praise. It was upon his Latin scholarship, however, that he rested his hopes of fame. His Latin works were highly esteemed, and

in 1341 he was called to Rome to receive the laureate crown awarded for his Latin poem of *Africa*, an epic on the Punic wars. At Parma he learned of the death of Laura, which he recorded on his copy of Virgil, and celebrated in his *Triumphs*. A large part of his time was employed in various diplomatic missions, and in 1370 he took up his residence at Arqua, near Padua, where he passed his remaining years in religious exercises, dying July 18, 1374. Among his Latin

Francesco Petrarca.

works are three books of Epistles (*Epistolæ Familiares*) and twelve Eclogues, his poem *Africa*, various philosophical, religious, political, and historical treatises; his Italian poems, on which his fame now entirely rests, chiefly consist of *Sonetti and Canzoni in Vita e in Morte di Laura*, and of *Trionfi* ('Triumphs'), a series of allegorical visions. His poems had an important influence on the development of Italian and modern European poetry.

Petrel (pet'rel), the common name of the web-footed oceanic birds of the family Procellaridæ. The petrels are nocturnal in their habits, breed in holes in the rocks, lay but one egg, and are almost all of small size and more or less somber plumage. The smaller species are well known to sailors under the name of Mother Carey's chickens, and their appearance is supposed to presage a storm. The term stormy petrel is more exclusively applied to the *Thalassidrŏma pelagica*, a bird which seems to run in a remarkable manner along the surface of the sea, where it picks up its food.

Petrie (pē'tri), William Matthew Flinders, archæologist, born at Woolwich, England, in 1853. He studied and wrote a work on *Stonehenge* in 1880, then studied the pyramids and temples of Gizeh, Egypt, and afterwards the Mounds of Said and other ancient cities, making many interesting discoveries. His *Ten Years' Diggings* and other works are valuable.

Petrifaction (pet-ri-fak'shun), a name given the organic bodies (animal or vegetable) which have, by slow process, been converted into stone. The term is used in much the same sense as *fossils*.

Petrikau, or Petrokoff. See *Piotrkov*.

Petrobrusians (pē-tro-brū'shanz), the followers of *Peter* (Pierre) de *Bruys*, a Provençal, who in the beginning of the 12th century preached against the doctrine of baptismal regeneration, the use of churches, altars, crucifixes, relics, etc., prayers for the dead, and the doctrine of the real presence.

Petrography (pē-trog'ra-fi), that branch of geology which deals with the rocks of the earth's surface, considered in relation to their mineral constituents, texture, and other physical characteristics.

Petroleum (pe-trō'le-um), a variety of naphtha, called also rock or mineral oil; a liquid, inflammable substance, in certain localities exuding from the earth, in some places collected on the surface of the water in wells, in other places obtained in great quantities by boring. It is essentially composed of a great number of hydrocarbons; is unctuous to the touch; exhales a strong odor; flows chiefly from beds associated with coal strata; and is found in enormous quantities in various parts of the United States and Russia (in the latter at Baku on the Caspian); in smaller quantities in many other countries. It yields kerosene, paraffin, and paraffin oil, so extensively employed for illuminating purposes; also lubricating oil and vaseline; and has been largely employed as liquid fuel in factories, locomotives, and steamships. Steamers, specially constructed with tanks, are now engaged in its transport, and in some large foreign cities great reservoir-tanks for its reception have been constructed. The greatest and most remarkable development of the petroleum industry began in 1859, when a company 'struck oil' by boring at Oil Creek, Pennsylvania, and obtained a supply of 400 gallons a day. This led to numerous other borings, and the oil was obtained in such quantities that towns of

considerable size soon sprang up in the oil district, railways were constructed, immense reservoirs were made, and long lines of oil pipes laid down, while large fortunes were realized. At first the borings were not very deep, and the oil generally flowed naturally; subsequently deeper borings were necessary, and the oil could only be raised to the surface by pumping. The United States leads the world both in the production, facilities of handling and refining. The oil-fields are well distributed throughout the country, and, although Pennsylvania is still a great producer, other fields have been opened up. The coast ranges of Southern California, principally in Ventura and Los Angeles counties, after abortive borings by inexperienced persons, were taken up by Pennsylvania and New York people versed in the business, and have since produced steadily and largely. California and Oklahoma now lead in production, and Illinois, West Virginia, Ohio, and Texas have also been found to contain profitable oil-belts. Several other states are also producers, Colorado and Wyoming producing an oil of much higher gravity than most of the others. Nearly 300,000,000 barrels (of 42 gallons each) of petroleum are estimated to be now produced annually in the world. Of this great total 180,000,000 are produced in the United States, 66,000,000 in Russia, and the remainder distributed among a dozen countries. The American yield of petroleum is steadily increasing, and has trebled within the last ten years.

Petrology, (pe-trol′ō-ji), the science of the composition of rocks of mineral formation.

Petromyzontidæ, (pe-trom-i-zon′ti-dē), the name given to a family of animals in allusion to the manner in which they remove small stones from their breeding-grounds — formed from the Greek *Petra*, a rock; *myzone*, sucking. They comprise the family known as lampreys. Their form is eel-like, the skin naked, the head of the adult is elongated, the dorsal, anal, and caudal fins represented by a continuous or interrupted membrane; the pectorals and ventrals not developed. All the species undergo a metamorphosis, a very different form being possessed by the young or larvæ.

Petro′nius Ar′biter, a Latin writer, notorious for his licentiousness, was born at Marseilles, and lived in the court of Nero. He is supposed by many authorities to be the author of *Satyricon Libri*, a work of fiction of great ability and licentiousness, of which only fragments have been preserved.

Petropavlovsk (pye-trō-päv′lofsk), a town and harbor of Asiatic Russia, formerly capital of Kamtchatka, on the east coast of Kamtchatka. It is now of little importance, its naval institutions having been transferred to Nikolaievsk.— Also a town of Central Asiatic Russia, in the government of Akmollinsk, on the Ischim. Pop. 21,796.

Petropolis (pā-trop′o-lēz), a town of Brazil, in the province of Rio de Janeiro, and 25 miles by rail from the city of that name. Pop. about 10,000.

Petroselinum (pet-rō-se-lī′num). See *Parsley*.

Petrovsk (pye-trofsk′), a town of Russia, in the government and 70 miles N.N.W. of the town of Saratov. Pop. 9806.

Petrozavodsk (pye-trō-za-votsk′), a town in Russia, capital of the government of Olonetz, on Lake Onega, 192 miles northeast of St. Petersburg. It has an important government marine and cannon foundry, and manufactures of iron and copper ware. Pop. 12,965.

Petsh, or IPEK, a town of European Turkey, in Albania, 73 miles N.E. of Scutari. Pop. about 12,000.

Pettie (pet′ti), JOHN, a distinguished painter, born at Edinburgh in 1839; studied there at the Royal Scottish Academy; exhibited *The Prison Pet* (1859) at Edinburgh, and began in the following year to exhibit in London. Remarkable alike for vigorous conception and technical dexterity his historical and *genre* paintings were numerous. Of these may be mentioned *The Drumhead Court-martial* (1864), *Disgrace of Wolsey* (1869), *Sword and Dagger Fight* (1877), *Two Strings to Her Bow* (1887), *The Traitor* (1888), and *Portraits* (1889). He was elected A. R. A. in 1866, and R. A. in 1873. He died in 1893.

Petty (pet′i), SIR WILLIAM, statistician and political economist, born at Romsey, Hampshire, in 1623; died in 1687. He was educated in his native town and in Normandy; served for a time in the navy; studied medicine at Utrecht, Leyden, and Paris; came to Oxford, and was (1649) elected a fellow of Brasenose; became professor of anatomy (1651), and in the following year joined the army in Ireland as a physician. Here he was appointed surveyor of the forfeited Irish estates (1654), and produced the Down Survey of Irish Lands. He became sec-

retary to Henry Cromwell, the lord-lieutenant; and in 1658 entered Parliament. He wrote a *Treatise of Taxes and Contributions.*

Pettychaps (pet'i-chaps), a name given to three or four small species of warblers of the genus *Sylvia*, such as the *S. trochilus* and the *S. sibilatrix.*

Petty Officer, an officer in the navy whose rank corresponds with that of a non-commissioned officer in the army. Petty officers are appointed and can be degraded by the captain of the vessel.

Petty Sessions, in England, are sessions of two or more justices of the peace, on which power is conferred by various statutes to try minor offenses without a jury.

Petunia (pe-tū'ni-a), a genus of American herbaceous plants, nat. order Solanaceæ, nearly allied to tobacco. They are much prized by horticulturists for the beauty of their flowers.

Petuntse (pe-tun'tze), PETUNTZE, the Chinese name for what is thought by geologists to be a partially decomposed granite used in the manufacture of porcelain.

Petworth-marble, also called *Sussex-marble*, from being worked at Petworth in Sussex, a variously-colored limestone occurring in the Weald clay, and composed of the remains of fresh-water shells.

Peutingerian Table (pū-tin-jer'i-an), a table of the roads of the ancient Roman world, written on parchment, and found in a library at Speyer in the fifteenth century. It was so named from Conrad *Peutinger*, a native of Augsburg, who was the first to make it generally known. It is supposed to have been constructed about A.D. 226.

Pew (pū), a separate inclosed seat in a church. In England pews are held in the Established Church either by prescriptive right, or by the will of the bishop. In the United States pews are sold to actual owners, or rented to seat-holders at a fixed price.

Pewter (pū'ter), an alloy of tin and lead, or of tin with proportions of lead, zinc, bismuth, antimony, or copper, and used for domestic utensils. One of the finest sorts of pewter is composed of 100 parts of tin to 17 parts of antimony, while the common pewter of which beer-mugs and other vessels are made consists of 4 parts of tin and 1 of lead. The kind of pewter of which tea-pots are made (called Britannia-metal) is an alloy of tin, brass, antimony, and bismuth.

Peyer's Glands, in anatomy, the clustered glands of the intestines, first discovered by a Swiss anatomist named Peyer. See *Intestine.*

Peyrouse, LA. See *La Pérouse.*

Pézenas (pā-zė-näs), a town of France, in the department of Hérault, on the left bank of the Hérault, at the confluence of the Peine, 25 miles W. S. W. from Montpellier. Pop. 6432.

Pez'ophaps. See *Solitaire.*

Pezop'orus. See *Parakeet.*

Pfalz (pfâlts). See *Palatinate.*

Pfalzburg (pfâlts'burh), town of German Lorraine in the Vosges, 25 miles N.W. of Strasburg. It was strongly fortified by Vauban, and until 1870 (when the fortifications were razed) the town was of importance as commanding the passes of the Vosges. Pop. about 4000.

Pfeffers, PFÄFFERS. See *Ragatz.*

Pfeiffer (pfī'fėr), IDA, an enthusiastic traveler, born at Vienna in 1797; died in 1858. In her youth she was educated by her father into masculine habits and hardiness; and on the death of her husband, Dr. Pfeiffer, an advocate, she determined to gratify her love of traveling. Accordingly, she visited Turkey, Palestine, and Egypt (1842); Scandinavia and Iceland (1845); journeyed round the world in 1846–48, visiting China, India, Persia, Greece, etc.; in 1852 visited California, Peru, Oregon, etc., and in 1856 explored Madagascar. The narratives of her various journeys have been translated into English.

Pfennig (pfen'ig), a small copper or rather bronze coin current in Germany, of which 100=1 mark; so that ten pfennige are worth a little over an English penny.

Pforzheim (pforts'hīm), a town of the Grand-duchy of Baden, 15 miles S.E. of Carlsruhe, on the northern edge of the Black Forest, at the junction of the Nagold with the Enz. The chief industry is in the making of gold and silver trinkets, and the other manufactures are machinery, castings, tools, chemicals, leather, paper, cloth, etc. Pop. 59,395.

Phacochere (fak'ō-kēr), PHACOCHŒRE, the wart-hog of Africa, a pachydermatous mammal of the

genus *Phacochœrus*, akin to the swine, characterized by a large wart-like excrescence on each side of the face. The tusks of the male project 8 or 9 inches beyond the lips, and form terrible weapons. *P. Eliani* is the Abyssinian phacochere or Ethiopian wild-boar.

Phacops (fa'kopz), a genus of fossil trilobites. *P. latifrons* is characteristic of the Devonian formation, and is all but world-wide in its distribution.

Phædo (fē'dō), a Greek philosopher, a scholar of Socrates, and founder of a school of philosophy in Elis. The dialogue of Plato on the immortality of the soul, which contains the conversation of Socrates in prison before his death, bears the name of Phædo. None of his own writings are extant.

Phædra (fē'dra), in Greek mythology, daughter of Minos, king of Crete, was the sister of Ariadne and wife of Theseus. She falsely accused her stepson, Hippolytus, of a criminal attempt upon her honor, an injustice of which she afterwards repented, and was either killed by her husband or committed suicide. Sophocles and Euripides made this the subject of tragedies (both of which are lost), and their example was followed by Racine.

Phædrus (fē'drus), a Latin writer of the Augustan age, who translated and imitated the fables of Æsop. He was a slave brought from Thracia or Macedonia to Rome, and manumitted by Augustus. Some authorities have doubted the genuineness of the fables ascribed to Phædrus, but their style is favorable to the supposition of their genuineness. There are five books, containing ninety-seven fables, attributed to him. They are notable for beauty of style and purity of language.

Phaëthōn (fā'e-tōn), a mythological character, who one day obtained leave from his father Helios (the Sun) to drive the chariot of the sun, but being unable to restrain the horses Zeus struck him with a thunderbolt and hurled him headlong into the river Po. The name in its English form of *Phæton* is applied to an open four-wheeled carriage.

Phagedæna (faj-e-dē'na), in medicine, a name given to a kind of obstinate gangrenous ulcer which eats into or corrodes the adjoining parts.

Phagocytes (fag'ō-sītz), the white or colorless blood corpuscles, also called leucocytes. They are cells with active ameboid functions and engulf both nutritive and injurious substances. These cells are now known to have important physiological functions, and that to their healthy activity is due the destruction of invading bacteria.

Phalanger (fal'an-jėr), the name given to the animals of the genus *Phalangista*, a genus of marsupial quadrupeds inhabiting Australasia; also called *phalangists*. They are generally of the size of a cat, are nocturnal in their habits, and live in trees,

Vulpine Phalanger (*Phalangista vulpīna*).

feeding on insects, fruits, leaves, etc. The sooty phalanger or tapoa (*P. fuliginōsa*), so-called from its color, is pretty common in Tasmania. The vulpine phalanger or vulpine opossum (*P. vulpīna*) is another species, common in Australia. See also *Flying Phalanger.*

Phalanges (fa-lan'jēz), the name applied to the separate bones of which the digits (or fingers and toes) of vertebrates are composed. Each digit or finger of the human hand consists of three phalanges, with the exception of the pollex or thumb, which is composed of two only.

Phalansterianism, PHALANSTERISM. See *Fourier.*

Phalanx (fal'anks), a name given generally by the Greeks to the whole of the heavy-armed infantry of an army, but more specifically to each of the grand divisions of that class of troops when formed in ranks and files close and deep, with their shields joined and their pikes crossing each other. The Spartan phalanx was commonly 8 feet deep, while the Theban phalanx was much deeper.

Phalaris (fal'a-ris), a ruler of Agrigentum in Sicily (probably between 571 and 549 B.C.), chiefly celebrated in tradition for his cruelty. He is said to have burned his victims in a brazen bull, within which a slow fire was kindled. By means of pipes fitted in its nostrils the shrieks of the tyrant's victims became like the bellowing of the animal. The letters of Phalaris, of which an English edition was

published in 1695, were shown to be spurious by Richard Bentley in his *Dissertation on Phalaris* (1699). See *Bentley.*

Phalaris, a small genus of grasses, of which the seed of one of the species, *P. canariensis*, or canary-grass, is extensively employed as food for birds, and commonly known as canary-seed.

Phalarope (fal′a-rōp), the common name of several grallatorial birds forming the genus *Phalarŏpus.* The gray phalarope (*P. lobātus*), frequently seen in Britain in the course of its migration from its Arctic breeding place to its southern winter quarters, is a beautiful bird, rather over 8 inches long, with a short tail and slender straight bill. The red-necked phalarope (*P. hyperborĕus*), which breeds in some of the most northern Scottish islands, is rather smaller than the gray phalarope.

Phallus (fal′lus), the emblem of the generative power in nature, carried in solemn procession in the Bacchic orgies of ancient Greece (see *Bacchanalia*), and also an object of veneration or worship among various Oriental nations. (See *Lingam.*) In botany, *Phallus* is a genus of fungi of the division Gasteromycetes. A most common species is *P. impudīcus* or *fœtidus*, popularly called *stinkhorn*, which has a fœtid and disgusting smell.

Phanerogamia (fan-e-ru-gă′mi-a), a primary division of the vegetable kingdom, comprising those plants which have their organs of reproduction (stamens and pistils) developed and distinctly apparent. See *Botany.*

Phantasmagoria (fan-tas-ma-gō′-ri-a), a term applied to the effects produced by a magic-lantern.

Pharaoh (fā′rō), the name given in the Bible to the kings of Egypt, corresponding to the P-RA or PH-RA of the Egyptian hieroglyphics, which signifies the sun. The identification of the Pharaohs mentioned in Scripture with the respective Egyptian kings, particularly the earlier ones, is a matter of great difficulty. See *Egypt.*

Pharaoh's Rat. See *Ichneumon.*

Pharisees (far′i-sēz), a religious sect among the Jews which had risen into great influence at the time of Christ, and played a prominent part in the events recorded in the New Testament. The most probable account of the origin of the Pharisees as a distinct sect is that which refers it to the reaction against the attempt of Antiochus Epiphanes to break down the distinctions between his Jewish and his Greek subjects. At the time of Christ the Pharisees stood as the national party in politics and religion — the opponents of the Sadducees. The fundamental principle of the Pharisees was that of the existence of an oral law to complete and explain the written law. 'Moses,' said the Mishna, 'received the law (the unwritten law is meant) from Sinai, and delivered it to Joshua, and Joshua to the elders, and the elders to the prophets, and the prophets to the men of the Great Synagogue.' This oral law declared the continuance of life after the death of the body, and the resurrection of the dead. This authoritative tradition received in process of time additions which were not pretended to be derived directly from Moses: — 1st, Decisions of the Great Synagogue by a majority of votes on disputed points. 2d, Decrees made by prophets and wise men in different ages. 3d, Legal decisions of proper ecclesiastical authorities on disputed questions. These authorities comprehended both the writers of the sacred books and their approved commentators. There is no doubt that, though their strict observance of small points often led to hypocrisy and self-glorification, the sect contained a body of pious, learned, and patriotic men of progress.

Pharmacopœia (fâr-ma-ku-pē′ya; Greek, *pharmakon*, drug, *poiia*, making), a book containing the prescriptions for the preparation of medicines recognized by the general body of practitioners. Up till 1863 separate Pharmacopœias were issued by the Colleges of Physicians of London, Edinburgh, and Dublin. There is now a British Pharmacopœia, issued by the medical council of the kingdom, and an American pharmacopœia, based on that of Britain.

Pharmacy (far′ma-si), PHARMACEUTICS (Greek, *pharmakon*, drug, *pharmakeuein*, to administer drugs), the art of preparing, compounding, and combining substances for medical purposes; the art of the apothecary. As these substances may be mineral, vegetable, or animal, theoretical pharmacy requires a knowledge of botany, zoölogy, and mineralogy; and as it is necessary to determine their properties, and the laws of their composition and decomposition, of chemistry also. In a narrower sense pharmacy is merely the art of compounding and mixing drugs according to the prescription of the physician. (See *Apothecary* and *Chemists.*) In pharmaceutical operations the apothe-

caries' weight is used, in which 20 grains make a scruple, 3 scruples a drachm, 8 drachms an ounce, and 12 ounces a pound; in fluid measure 60 minims (drops) make 1 fluid drachm, and 8 drachms a fluid ounce. The following abbreviations and signs are used by physicians in writing their prescriptions: ℥, ounce; ʒ, drachm; ℈, scruple; f. ℥, fluid ounce; f. ʒ, fluid drachm; ♏, minim; Gut. (*gutta*), drop; Cochl. (*cochleāre*), spoonful; j. or i., one; ss., half: āā or ana, of each; q. s. (*quantum sufficit*), as much as necessary; p. e., equal parts.

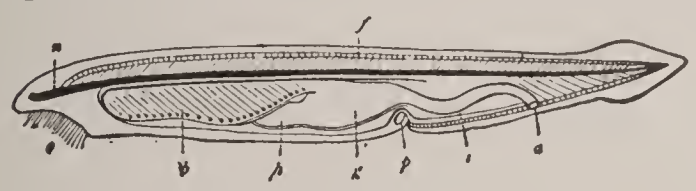
Pharnaces (far'na-sēz), a king of Pontus overthrown by Cæsar in 47 B. C., a victory announced in the famous message sent to Rome: *Veni, vidi, vici.*

Pharo, a game. See *Faro.*

Pharos (fā'ros), a lighthouse. The name is derived from the island of Pharos, close to and now part of Alexandria, which protected the port of that city. On the eastern promontory of the island stood the lighthouse of Alexandria, so famous in antiquity, and considered one of the wonders of the world, built 300 years B. C. See *Lighthouse.*

Pharsalus (far-sā'lus), a town of ancient Thessaly, near which Cæsar defeated Pompey, B. C. 48. (See *Cæsar* and *Pompey.*) It is now represented by the small town Phersala, seat of a Greek archbishop. Pop. 1363.

Pharyngobranchii (fa-rin-go-brang'ki-ī; 'pharynx-gilled'), the name applied to



Pharyngobranchii.

The Lancelet (*Amphioxus lanceolatus*), enlarged. *o*, Mouth; *b*, Branchial sac; *g*, Stomach; *h*, Diverticulum representing the liver; *i*, Intestine; *a*, Anus; *n*, Notochord; *f*, Rudiments of fin-rays; *p*, Abdominal pore.

the lowest order of fishes, represented solely by the lancelet (which see).

Pharyngognathi (fa-rin-gog'na-thī), a tribe of acanthopterous fishes, which includes the wrasses, the parrot-fishes, the garfish, saury-pikes, and flying-fish.

Pharynx (fa'ringks), the term applied to the muscular sac which intervenes between the cavity of the mouth and the narrow œsophagus, with which it is continuous. It is of a funnel shape, and about 4 inches in length; the posterior nostrils open into it above the soft palate, while the larynx, with its lid, the epiglottis, is in front and below. The contraction of the pharynx transmits the food from the mouth to the œsophagus. From it proceed the eustachian tubes to the ears.

Phascogale (fas-kog'a-le), a genus of small marsupials, closely allied to the dasyures, found throughout Australia, New Guinea, etc.

Phascolarctos (fas-kal-ark'tos). See *Koala.*

Phascolomys (fas-kol'o-mis), the generic name of the wombat (which see).

Phase (fāz), in astronomy, one of the recurring appearances or states of the moon or a planet in respect to quantity of illumination, or figure of enlightened disc.

Phaseolus (fa-sē'o-lus), the genus of leguminous plants to which belong the kidney-bean and scarlet-runner. See *French Bean.*

Phasian'idæ, Phasia'nus. See *Pheasant.*

Phasis (fā'sis), a river of Colchis (Transcaucasia), now called the Rion, anciently regarded as the boundary between Europe and Asia. It rises in a spur of the Caucasus, flows in a generally western direction, and falls into the Black Sea near Poti. Pheasants are said to have been first brought to Europe from the banks of this river, hence their name.

Phasmidæ (fas'mi-dē), specter insects or walking-sticks, a family of orthopterous insects allied to

Phasmidæ, or Specter Insects.

1, *Cladomorphus phyllinus* (Brazilian Walking-stick). 2, *Acrophylla chronus,* Australia.

the Mantidæ, restricted to warm countries, and remarkable for their very close resemblance to the objects in the midst of which they live, this peculiarity, known as *mimicry*, being their only protection against their enemies. The family includes the genera *Phasma*, *Phyllium*, *Cladomorphus*, etc. Some of them are destitute of wings, and have the appearance of dead twigs, while the absence of motion in the insects adds to the deception. In others, as the genus *Phyllium*, the wings have the appearance of withered leaves, while the brighter hue of the wing-covers of a few of larger size, give to the animal the appearance of a fresher leaf.

Pheasant (fez′ant), the general name given to birds of the family Phasianidæ, which comprises several genera besides that of the pheasants proper, *Phasiānus*. There are usually naked spaces of skin on the head or cheeks and often combs or wattles. The plumage of the males is brilliant, that of the females more sober, and the males carry spurs on the tarso-metatarsus.

Golden Pheasant (*Thaumalea picta*).

The wings are short, the tail long. The three front toes are united by a membrane up to the first joint, and the hinder toe is articulated to the tarsus. The food consists of grains, soft herbage, roots, and insects. They are chiefly terrestrial in habits, taking short rapid flights when alarmed. The pheasants are polygamous, the males and females consorting together during breeding-time, which occurs in spring. The common pheasant (*Phasianus Colchicus*), now fully domesticated but originally said to be a native of the banks of the Phasis in Western Asia, is the familiar species. It extends in its distribution over Southern Europe, and is said even to exist in Siberia. These birds breed freely in a domesticated state. The pheasant will interbreed with the common fowl, the Guinea fowl, and even with the black grouse; and there are white and pied varieties of the common species. The hybrid produced by the union of a cock-pheasant with the common hen is termed a *pero*. Other species inhabiting Southern Asia and the Eastern Archipelago are the Diard's pheasant of Japan (*P. versicolor*); Reeve's pheasant (*P. veneratus*) of China; and Sömmering's pheasant (*P. Sömmeringii*), found in Japan. There are various others often put in different genera, as the firebacks, birds of rich plumage, natives of Siam and the adjacent islands; the silver pheasants (genus *Euplocămus*), of China, Burmah, and various parts of India, with a generally white plumage, the feathers marked with fine black lines; the golden pheasant of Tibet and China, the type of the genus *Thaumalea*. It is noted for its brilliant colors and magnificent crest. See also *Argus Pheasant*, *Impey Pheasant*, *Tragopan*.

Pheasant's Eye. See *Adonis*.

Pheasant Shell (*Phasianella*), a genus of gasteropodous mollusca, found in South America, India, Australia, the Mediterranean, etc. The shell is spiral and obovate, the outside polished and richly colored.

Phelps (felpz), Edward John, diplomatist, was born at Middlebury, Vermont, in 1822; died in 1900. He became professor of law at Yale in 1881, was United States minister to England 1885–89, and one of the counsel for this country in the Behring Sea arbitration of 1893.

Phenic Acid, Phenol. See *Carbolic Acid*.

Phenomenalism (fe-nom′e-nal-izm), that system of philosophy which inquires only into the causes of existing phenomena. The sceptical phenomenalism of Hume is now represented by *Positivism*. A phenomenalist does not believe in an invariable connection between cause and effect, but holds this generally acknowledged relation to be nothing more than a habitually observed sequence.

Phenylamine (fen-il′a-mīn). Same as *Aniline*.

Pheræ (fe′rē), an ancient city of Thessaly, which under the rule of tyrants of its own became a controlling power of the whole of Thessaly, and for long made its influence felt in the affairs of Greece. In 352 B. C. it became subject, with the rest of Thessaly, to Philip of Macedon.

Pherecydes (fer-i-sī′dēz), a Greek philosopher of the 6th century B. C., a native of the island of Syros, and a contemporary of Thales. He is said to have taught the doctrine of metempsychosis, or of the immortality of the soul, and to have been the in-

BROAD STREET, PHILADELPHIA

This magnificent thoroughfare forms the north and south axis of the city. It is 113 feet wide and over 14 miles long, the largest straight stretch of asphalted highway in the world. The structure in the center is the Public Buildings, 534 feet high. On the top is the statue of William Penn.

structor of Pythagoras. Some fragments of his work are extant.

Phidias (fid'i-as), a celebrated Greek sculptor, who was born about 490 B.C., and flourished in the age of Pericles, but of whose life hardly any particulars are known. Among his works were three statues of Athena which were all in the Acropolis of Athens in the time of Pausanias. One colossal statue of Athena was in bronze, and the goddess was represented as a warrior-goddess in the attitude of battle. The second and still more famous stood in the Parthenon, and was made of ivory and gold, representing Athena standing with a spear in one hand and an image of Victory in the other; it measured, with the pedestal, about 41½ feet in height. The third statue, in bronze, of a smaller size, was called emphatically the *beautiful*, on account of its exquisite proportions. Another colossal statue by Phidias, that of Zeus at Olympia, was ranked for its beauty among the wonders of the world. Zeus was here seen sitting upon a throne, with an olive wreath of gold about his temples; the upper part of his body was naked; a wide mantle, covering the rest of it, hung down in the richest folds to his feet, which rested on a footstool. The naked parts of the statue were of ivory, the dress was of beaten gold. The right hand held a Victory, and the left a scepter tipped with the eagle. The Zeus was removed to Constantinople by Theodosius I, and was destroyed by fire in 475 A. D. During the government of Pericles, which lasted twenty years, Athens was adorned with costly temples, colonnades, and other works of art. Phidias superintended these improvements; and the sculptures with which the Parthenon, for instance, among other buildings, was adorned, were partly his own work, and partly in the spirit and after the ideas of this great master. Of the merits of these we can ourselves judge. (See *Elgin Marbles*, *Parthenon.*) Phidias received great honors from the Athenians, but he is also said to have been falsely accused of peculation, and of impiety for putting his own likeness and that of Pericles on the shield of Athena. He died probably about B. C. 432.

Phigalia (fē-gā-lē'yȧ), a city of ancient Greece in the most mountainous part of Arcadia. On one of the mountains, Mount Cotylium, to the northeast of the site of Phigalia, is situated the temple of Apollo Epicurius, built in the time of the Peloponnesian war by Ictinus, the architect of the Parthenon at Athens, and still one of the best-preserved temples in Greece. The frieze, which was usually on the exterior of the temple, was here in the interior, and with the metopes was of Parian marble. It is now in the British Museum, and is quite complete, consisting of 23 slabs of marble 2 feet high, carved in high relief, the whole being 101 feet long. The subjects are the battle of the Lapithæ and the Centaurs, and that between the Amazons and the Greeks, the school being that of Phidias.

Philadelphia (fil-ȧ-del'fi-ȧ) (1) an ancient city of Palestine, east of the Jordan, originally Rabbath-Ammon, the ancient capital of the Ammonites. (2) An important city in the east of Lydia. See *Ala-Shehr.*

Philadelphia, a city and river port of the United States, in Pennsylvania, ranks as the third largest city in the Union. It is situated on the rivers Delaware and Schuylkill, and, following the course of Delaware Bay and River, is 96 miles from the Atlantic Ocean. New York lies 97 miles to the northeast and Washington 136 miles to the southwest. The site is nearly flat, but slopes gently towards both the Delaware and the Schuylkill. The houses are largely built of brick, with white marble trimmings. The streets were originally laid out so as to run nearly due westward from the Delaware, intersected by other streets running nearly north and south, and still almost everywhere the streets cross each other at right angles. Market Street, the great central street running east and west, and continuously built upon for several miles, has a width of 100 feet; Broad Street, the principal central street running north and south, is built upon to a much greater length, and is 113 feet in width. Most of the other chief streets vary from 50 to 66 feet broad, some of the avenues, however, being much wider. An extensive system of street railway extends through nearly all the wider streets with subway and elevated railway extending through the entire length of Market Street. A number of bridges, for railway and general traffic, span the Schuylkill and a regular service of steam-ferries across the Delaware affords communication with the New Jersey side of the river. Philadelphia is the fortunate possessor of several of the chief historical monuments of the United States, the most notable of these being the State House, containing a large room called Independence Hall, from the circumstance that the Declaration of Independence was signed there (July 4, 1776). The Liberty Bell, said to have signaled that fact to the peo-

UNIVERSITY OF PENNSYLVANIA

A portion of the campus. From left to right the buildings are College Hall, Houston Hall, the Hospital, Hare Laboratory and Logan Hall.

ple, is preserved as an invaluable historic treasure. Carpenters' Hall, in which the first Congress met; Christ Church, which Washington attended while President, and other historic sites, are sedulously preserved. Among the other notable buildings are the custom-house, a white marble edifice; the United States new mint, a granite-fronted building; the post-office, a large and handsome granite structure with a dome; the new City Hall, having an elevation of 547 feet and surmounted by a colossal statue of Penn; Girard College, a fine example of the Corinthian style; the buildings of the University of Pennsylvania; the Memorial and Horticultural Halls in Fairmount Park, erected in 1876 for the Centennial Exhibition, and still retained; many handsome churches, banks, insurance offices, etc. Charitable institutions are numerous and efficient. The educational establishments include the University of Pennsylvania, with a medical department; the Jefferson Medical College; the Women's Medical College; the Medico-Chirurgical College, the Hahnemann College, the College of Pharmacy; the Academy of Fine Arts; the Drexel Institute; Temple University; the School of Industrial Art; the School of Design for Women; the Philadelphia Museums; numerous colleges and educational institutions supported by the religious denominations; Girard College, devoted to the secular education of orphan boys; and the public schools. Many of the above institutions possess extensive and valuable libraries, in addition to which are the large collections belonging to the Philadelphia Library, the Mercantile Library, the Free Library, with its many branches, the University and the Academy of Science libraries, and various others; while Philadelphia is one of the recognized centers of literary, dramatic, and artistic culture. Scientific progress is represented by the Academy of Natural Sciences, the Franklin Institute, the Philosophical Society, Historical Society, etc. In addition to the public squares the chief place of outdoor recreation is Fairmount Park, with an area of over 3000 acres, possessing much natural beauty, being well wooded, and having a great variety of surface. A handsome Parkway, adorned with magnificent buildings, is projected to connect the park entrance with the City Hall. The principal places of indoor amusements are the opera houses, theaters, numerous concert-rooms, etc. Philadelphia ranks high as a center of foreign, inland, and coasting trade. The leading articles of export are grain, provisions, petroleum, anthracite and gas-coal, iron and iron-wares, lumber, tobacco, and cotton (raw and manufactured). The principal imports consist of cotton, woolen, and flax goods, tin-plate, iron and iron-ore, chemicals, etc. The river channel is being deepened so that the largest merchant ships may reach the wharves. Philadelphia is the first manufacturing city in the United States, the carpet industry being the largest in the country. The same may be said of the locomotive industry, the largest in the world, and also of the shipbuilding industry of the city and its environs. The other leading manufactures are iron and steel, machinery and tools, refined sugar, clothing, boots and shoes, brewery products, chemicals, household furniture, and a great variety besides.— Philadelphia was founded and named by William Penn in 1682 as the capital of his colony of Pennsylvania. For a long time it was almost exclusively occupied and controlled by Quakers. Many of its most important improvements were due to Benjamin Franklin, and it played a most prominent part during the Revolutionary war. In May–November, 1876 (a hundred years after the issue of the Declaration of Independence), a Centennial Exhibition, the first World's Fair in the United States, was held on the grounds at the southwest extremity of Fairmount Park. It was a large and imposing display of art and industry and has left the city two well-filled structures, the Horticultural and Memorial halls. The city has magnificent railroad terminals. The Pennsylvania Railroad station, completed in 1894, is of modern Gothic, absolutely fireproof; the train shed is one of the largest single spans ever constructed, being 304 ft., covering sixteen tracks. The Philadelphia & Reading Railroad terminal is of composite Renaissance, and built of New England granite, brick, and terra-cotta. The train shed has a clear span of 266 ft., covering thirteen tracks. Of more recent construction is the Baltimore & Ohio Railroad terminal, a handsome structure. All these run, by underground or elevated tracks, to the center of the city. No city in the Union is better provided with freight terminals than Philadelphia. The area of the municipality is 130 sq. miles, embracing the whole county. Of this a considerable portion in the northern section is rural in character, but the greater part of the area is closely built over, the city containing an enormous number of well-built two-story residences for people of small means. In this respect there is no other city its equal, and it has well been called a 'city of homes.' Pop. 1,549,008.

Philemon (fil-ē′mon), Epistle of Paul to, one of the books of the New Testament. This epistle, according to the prevalent opinion, was, together with the Epistles to the Ephesians, Colossians, and Philippians, written from Rome during St. Paul's first imprisonment in that city. The only doubt thrown on this opinion by those who accept the genuineness of the epistles is contained in the suggestion supported by Meyer and others, that these epistles were written during the apostle's imprisonment at Cæsarea. The genuineness and authenticity of Philemon is questioned by very few critics.

Philetas of Cos (fil-ē′tas), a Greek poet and critic, flourished between 350 and 290 B.C. He wrote elegies, epigrams, and prose grammatical works. He was preceptor to Ptolemy Philadelphus, and a favorite model of Theocritus. Fragments of his poems are extant.

Philidor (fil′i-dor), François André Danican, a French musical composer and celebrated chess player; born in 1726; died in 1795. In early youth he was a chorister in the chapel of Louis XV, and afterwards supported himself as a teacher and copier of music. He traveled in Holland, Germany, England, etc., and in 1753, when in England, he set Dryden's *Ode for St. Cecilia's Day* to music. He had while here devoted his attention principally to chess; and he gained extended fame from having published his analysis of the game, which is still referred to as an authority. On his return to France, in 1754, he produced about twenty operas at the Opéra Comique. He went to London in 1779, where he produced the music to Horace's *Carmen Sœculare*, his best work. Having been pensioned for his services he abandoned musical composition altogether, in 1788, in order to give himself up entirely to chess.

Philip (fil′ip), one of the twelve apostles, according to John's gospel 'of Bethsaida, the city of Andrew and Peter,' and who was called to follow Jesus at Bethany. After the resurrection he was present at the election of Matthias to the apostleship, but is not again mentioned. In the Western church he is commemorated on May 1.— Philip the Evangelist, often confounded with the above, is first mentioned in Acts vi, 5. He preached at Smyrna, where Simon Magus was one of his converts; baptized the Ethiopian eunuch; entertained Paul and his companion on their way to Jerusalem, when 'he had four daughters which did prophesy.'

Philip II, King of Macedon, the most famous of the five Macedonian kings of this name, and the father of Alexander the Great, was a son of Amyntas II, born B.C. 382. He passed a portion of his early years in Thebes, where he became well acquainted with Greek literature and politics, and succeeded his elder brother, Perdiccas, in 360. His position at first was not very secure, but as he had few scruples and was a man of the highest talents both for war and diplomacy, in a short time he had firmly established himself, had reorganized the Macedonian army, and proceeded to extend his sway beyond his own kingdom. His ambition was to make himself, in the first place, supreme in Greece, and to accomplish this he began by seizing the Greek towns on his borders: Amphipolis, which gave him access to the gold-mines of Mount Pangæus, Potidæa, Olynthus, etc. The 'sacred war' carried on by the Amphictyonic council against the Phocians gave Philip his first opportunity for interfering directly in the affairs of Greece. (See *Greece.*) After the capture of Methone — the last possession of the Athenians on the Macedonian coast — between 354 and 352, Philip made himself master of Thessaly, and endeavored to force the pass of Thermopylæ, but was repulsed by the Athenians; Philip, however, compensated himself by equipping a navy to harass the Athenian commerce. The terror of his name now provoked the 'Philippics' of Demosthenes, who endeavored to rouse the people of Athens to form a general league of the Greeks against him; but by 346 he was master of the Phocian cities and of the pass of Thermopylæ, and as general to the Amphictyonic council he was the crowned protector of the Grecian faith. In the spirit proper to his office he marched into Greece to punish the Locrians for an act of profanity; but instead he seized the city of Elatea, and began to fortify it. Demosthenes now exerted all his eloquence and statesmanship to raise the ancient spirit of Grecian independence, and a powerful army was soon in the field, but being without able or patriotic commanders it was defeated at the decisive battle of Chæroneia in August, 338 B. C. After this last struggle for freedom Philip was acknowledged chief of the whole Hellenic world, and at a congress held at Corinth he was appointed commander of the Greek forces, and was to organize an expedition against Persia. While preparing for this enterprise he was murdered in 336 B. C., some say at the instigation of his wife Olympias.

Philip I, King of France, son of Henry I, was born 1052, and succeeded to the throne under the guardianship of Baldwin V, count of Flanders, in 1060. The Norman conquest of England took place in his reign, and he supported Prince Robert, son of the Conqueror, in his revolt against his father. He was a worthless debauchee and was detested by his subjects. He died in 1108.

Philip II, Augustus, King of France, born 1165, was crowned as successor during the lifetime of his father, Louis VII, whom he succeeded in 1180. One of his first measures was the banishment of the Jews from the kingdom, and the confiscation of their property. Philip next endeavored to repress the tyranny and rapacity of the nobles, which he effected partly by art and partly by force. In 1190 he embarked at Genoa on a crusade to the Holy Land, where he met Richard Cœur de Lion, who was engaged in the same cause in Sicily. The jealousies and disputes which divided the two kings induced Philip to return home the next year. He invaded Normandy during Richard's captivity (1193), confiscated the possessions of King John in France after the death of Prince Arthur (1203), prepared to invade England at the instance of the pope (1213), turned his arms against Flanders and gained the celebrated battle of Bouvines (1214). He died in 1223.

Philip III, called the *Hardy*, King of France, was the son of Louis IX and Margaret of Provence. He was born in 1245, and succeeded his father in 1270. In 1271 he possessed himself of Toulouse on the death of his uncle, Alphonso; in 1272 he repressed the revolt of Roger, count of Foix, and in 1276 sustained a war against Alphonso X, king of Castile. The invasion of Sicily by Peter of Aragon, and the massacre of the French, known as 'the Sicilian vespers,' caused him to make war against that prince, in the course of which he died, 1285.

Philip IV (Le Bel), King of France, was born in 1268, and succeeded his father in 1285. He had already married Joanna, queen of Navarre, by which alliance he added Champagne as well as Navarre to the royal domain, which he made it his policy still further to increase at the expense of the great vassals. He even attempted to take Guienne from Edward I of England, but afterwards entered into an alliance with that monarch, and gave him his daughter in marriage (1299), from which originated the claim of Edward III on the crown of France. He was long engaged in war with Flanders, which resulted in the accession of the Walloon territory to France, and the restoration of the rest of Flanders to its count on condition of feudal homage. Philip had been engaged at the same time in a violent dispute with Pope Boniface VIII, in which he was supported by the States-general, and he publicly burned the pope's bull excommunicating him. On the death of Boniface and of Benedict XI, Clement V, who succeeded the latter, was elected by the influence of Philip, and fixed his residence at Avignon. Clement before his election entered into a regular treaty as to the terms on which he should receive the pontificate. The destruction of the order of the Templars (1307–12), and the seizure by the king of their goods and estates, was one of the fruits of this alliance. Philip left numerous ordinances for the administration of the kingdom, which mark the decline of feudalism and the growth of the royal power. He also convoked and consulted the States-general for the first time. He died in 1314.

Philip VI, of Valois, King of France, was the nephew of Philip IV, to whose last son, Charles IV, he succeeded in virtue of the Salique law. He was born in 1293, and succeeded to the crown in 1328. In his reign occurred the wars with Edward III of England, who claimed the French crown as grandson, by his mother, of Philip IV (see above article). Philip died in 1350. His reign was unfortunate for France by the long war which it inaugurated, known in France as the Hundred Years' war; and he has left an evil memory by his persecutions of Jews and heretics, his confiscations and exactions.

Philip II, of Spain, was the son of Charles V and Isabella of Portugal, and was born at Valladolid in 1527. He was married in succession to the Princess Mary of Portugal in 1543, and to Mary of England in 1554, the same year in which he became king of Naples and Sicily by the abdication of his father. In 1555 his father resolved to abdicate the sovereignty of the Netherlands in Philip's favor. This was done in public assembly at Brussels on October 25, 1555; and on January 16, 1556, in the same hall, he received, in presence of the Spanish grandees then in the Netherlands, the crown of Spain, with its possessions in Asia, Africa, and America. His first act was to propose a truce with France, which was broken almost as soon as concluded. In 1556 he went to England,

where he was refused the ceremony of a coronation and the troops that he demanded in aid of his war with France. These, however, were at length conceded to him by Mary, in violation of her marriage articles, and the levy, joined to the army of Emanuel Philibert, duke of Savoy, and Count Egmont, assisted to gain the battle of St. Quintin, August 10, 1557. On the death of Mary, in 1558, Philip, who was still prosecuting the war, made proposals of marriage to her successor, Elizabeth, and was refused. In 1559 the French war was concluded by the peace of Cateau-Cambrésis and the marriage of Philip to Elizabeth of France, daughter of Henry II. Philip then finally left the Netherlands, having appointed his half-sister Margaret sovereign of the provinces, his main object in returning to Spain being to check the progress which the Reformation had made

Philip II of Spain.

there. On his arrival in his native country he had the satisfaction of being present at an *auto-de-fé;* and a few years' perseverance in similar measures extinguished the cause of the Reformation, together with the spirit of freedom and enterprise in Spain. The cause of religion in France was also a constant subject of solicitude with Philip. In Naples, as in Spain, his zeal led him to persecute the Protestants; but it was in the Netherlands that his tyranny and obstinacy had their most disastrous, though ultimately fortunate, results. In 1556 the revolt of the Netherlands began, ending eventually in the separation of the seven northern provinces from the crown of Spain, and their formation into the Dutch republic. This struggle lasted about thirty years, till the close of Philip's reign. The events of this protracted struggle were varied in 1567 by a domestic tragedy — the rebellion, arrest, and suspicious death of Don Carlos, the son of Philip and his first wife Mary of Portugal. Shortly afterwards he lost the Queen Elizabeth, his third wife, and about the same time the Moors of Granada revolted, whose subjugation was effected in 1570. In 1571 the Archduchess Anne of Austria became his fourth wife, and the same year his natural brother, Don John of Austria, obtained the great naval victory of Lepanto over the Turks. In 1580 his troops under Alva subdued Portugal, of which, and all its dependencies, Philip now became sovereign. About this time he found political motives for intriguing with the Huguenots in France, and twice in 1582 made offers of assistance to Henry, King of Navarre. In 1584 he renewed his alliance with the League, in order to oppose the succession of Henry to the crown of France. In 1586 Philip declared war with England. The year 1588 saw the destruction of the Armada and the descent of Spain from her position as a first-class power in Europe. The remainder of his reign was occupied with war and intrigues with France, but in 1598 the Peace of Vervins was concluded. Philip showed some disposition at the same time to make peace with England and the Netherlands, but his offers were not accepted, and he died in 1598 without recognizing the independence of the latter country or being reconciled to the former. Before his death he had bestowed the sovereignty of the Spanish Netherlands on his daughter Isabella, subject to the crown of Spain.

Philip V, OF SPAIN, the first Spanish king of the Bourbon dynasty, was born at Versailles in 1683; died in 1746. He was the grandson of Louis XIV of France, and succeeded to the crown of Spain by the will of Charles II, who died without direct heirs, as the grandson of Charles' elder sister. On the death of Charles in November, 1700, Philip was immediately proclaimed king, and was generally recognized in Spain, Naples, and the Netherlands; but the succession was contested by the Archduke Charles of Austria, whose claim was enforced by the armies of England, Holland, and Austria in the wars of the Spanish Succession, which began in 1702. By the Treaty of Utrecht (1713) he was recognized as King of Spain, but Gibraltar was lost to Spain, Minorca was also ceded to England, Sicily to Savoy, the Netherlands, Naples, and the Milanese to Austria. He married Elizabeth Farnese, niece of the Duke of Parma, in 1714,

PHILIPPINE ISLANDS

Scale of Miles
0 20 40 60 80 100

Important towns are shown in heavy face type

BATAN AND BABUYAN ISLANDS

Same scale as large map

FORMOSA
(To Japan)
Bachi Channel
IBAYAT
BATAN ISLANDS
SABTANG
BATAN
Balingtang
BALINGTANG IS.
Channel
BABUYAN
CALAYAN
DALUPIRI
FUGA
CAMIGUIN
Claveria
C. Bojeador
C. Engano
PALAUI I.
Abulug
Aparri
LUZON

MANILA
Scale 0 ½ 1 Mile

TO GUAM, HAWAII AND SAN FRANCISCO

SEA OF LUZON

SULU SEA

CELEBES SEA

Longitude East from Greenwich

and Alberoni, the minister of the Duke of Parma in Spain, became prime-minister. As Philip had a son by his first wife, the daughter of the Duke of Savoy, the children of Elizabeth could not succeed to the crown of Spain. Elizabeth wished to provide for them in Italy, and even coveted the reversion of the crown of France. These pretensions formed the basis of schemes on Alberoni's part which alienated France and led to the Triple Alliance, formed in 1717 by Great Britain, France, and Holland against Spain, and which was afterwards merged by the accession of Austria into the Quadruple Alliance. The invasion of Spain by the Duke of Berwick compelled Philip to accede to the terms of the alliance. In 1724 Philip resigned the crown of Spain in favor of his son Don Louis, but the death of Louis a few months later induced him to resume the royal power. He died in 1746, after a reign of forty-six years. Philip was constantly governed by favorites, and his constitutional melancholy at last completely incapacitated him for business.

Philip, THE BOLD, Duke of Burgundy, born in 1342, was the fourth son of John, king of France. He fought at Poitiers (1356), where, according to Froissart, he acquired the surname of the Bold. He shared his father's captivity in England, and on his return his father, whose favorite he was, made him Duke of Touraine, gave him the Duchy of Burgundy, and made him premier peer of France. He was one of the most powerful French princes during the minority of Charles VI, during whose insanity he acted as regent, retaining the regency till his death in 1404.

Philip I (THE MAGNANIMOUS), Landgrave of Hesse, born in 1504. He began to reign at the age of fourteen, and introduced the Lutheran religion into Hesse in 1526. In 1527 he founded the University of Marburg, subscribed the protestation to the Diet of Spires in 1529, submitted the Confession of Faith at Augsburg in 1530, and in 1531 formed with the Protestant princes the Schmalkalden League. He was forced to submit to the Emperor Charles V in 1547, who kept him a prisoner for five years. After his return to his dominions he sent a body of auxiliaries to assist the French Huguenots. He died in 1567.

Philiphaugh (fil'ip-hou), a locality in Scotland 2 miles S.W. of Selkirk, the scene of Sir David Leslie's victory over the Marquis of Montrose, September 13, 1645. A monument marks the field.

Philippeville (fil'ip-vil), a city and port of Algeria, in the province and 39½ miles N.N.E of Constantine. It was founded in 1837, is well laid out, has several spacious squares and fine streets; is connected by rail with Constantine, and has considerable trade. Pop. (1906) 16,339.

Philippi (fil-ip'i), a city of Macedonia, now in ruins, founded by Philip of Macedon about B. C. 356. The two battles fought in B. C. 42, which resulted in the overthrow of Brutus and Cassius by Antony and Octavius, were fought here. Philippi was visited on several occasions by the apostle Paul, who addressed to the church there one of his epistles.

Philippians (fil-ip'i-anz), EPISTLE TO THE, one of St. Paul's epistles, is supposed to have been written from Rome towards the close of his first imprisonment there, about A. D. 63. Some authorities suppose it to have been written in Cæsarea. The genuineness of this epistle has been little questioned. It is referred to, though not quoted, in the epistle of Polycarp and by Tertullian and other early fathers. Epaphroditus, who conveyed it, was the messenger of the Philippians to Paul, and had been ill at Rome, which had been a cause of anxiety to the Philippians. Paul, therefore, hastened his return, and sent this epistle by him.

Philippics (fil-ip'iks), the name given to three celebrated orations of the Greek orator Demosthenes against Philip, king of Macedon (352–342 B. C.). This name was also applied to Cicero's fourteen speeches against Antony, and it has hence come to signify an invective in general.

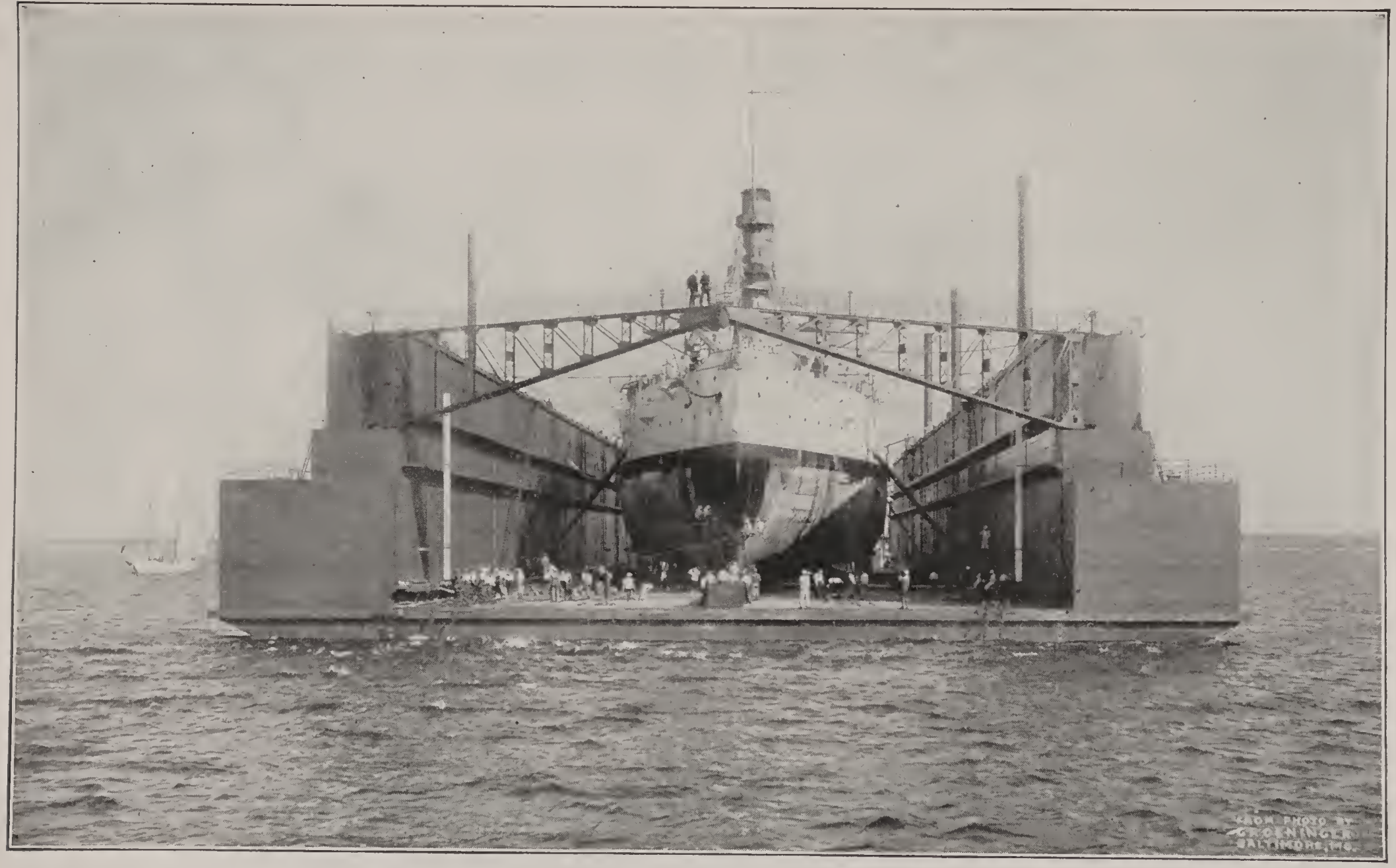
Philippines (fil'ip-pēnz), or PHILIPPINE ISLANDS, an archipelago under United States control in the Pacific Ocean, northeast of Borneo, having on the west the China Sea, on the north and east the North Pacific, and on the south the Sea of Celebes; area, 115,026 square miles; pop., in 1903, 7,635,426. It consists of about 1200 large and small islands. Of the former the chief are Luzon, Mindoro, Samar, Panay, Leyte, Cebu, Negros, Bohol, Mindanao, and Palawan. Luzon is the only island of great commercial importance. It contains the capital, Manila, and has about half the population, 3,798,507. The shore lines and internal surface of the larger islands are extremely rugged and irregular. They are largely of volcanic formation and are traversed by irregular chains of mountains, trending generally N. and S.

The mountain ranges are clothed with a gigantic and ever-teeming vegetation, and between them lie extensive slopes and plains of the richest tropical fertility, watered by numerous lakes and rivers, which afford abundant means of irrigation and transport. The climate on the whole is healthy, but hurricanes are common. Earthquakes are frequent, and often very destructive. The principal agricultural product is rice, and next in importance are sugar-cane, tobacco, and coffee. Fibrous plants are also abundant, and among the chief of these are the well-known Manila hemp, the cotton-plant, the gomuti palm, ramee, etc. The pineapple is grown both for its fiber and its fruit. The textile productions of the Philippines, the work of the native population, are considerable in number, ranging from the delicate and costly *pina muslins*, made from the pineapple fiber, to coarse cottons, sacking, and the mats made of Manila hemp, and the fiber of the gomuti palm. The islands are rich in minerals, including gold, silver, copper, lead, iron, quicksilver, sulphur, coal, and petroleum, but they are little worked. The leading industries are the production and manufacture of hemp, tobacco and cigars, sugar, copra, distilling, shipbuilding and lumbering. The foreign trade is mostly in the hands of foreign, especially British and American, mercantile houses, and consists principally in the export of sugar, rice, tobacco, Manila hemp, indigo, coffee, birds'-nests, trepang, sapan-wood, dye-woods, hides, rattans, mother-of-pearl, gold-dust, etc., and in importing wines and liquors, foodstuffs, and various manufactured articles. The natives are of diverse origin, and represent every stage of development from savagery to a high state of culture. Wild tribes, some of which are extremely ferocious, still haunt the mountains. The chief mountain tribes are the Negritos, a diminutive negro-like race, who have given their name to the island Negros, though not confined to it. But the great mass of the inhabitants are divided into the Tagals, inhabiting Luzon, and the Bisayans, who inhabit the other islands. These speak respectively the Tagal and Bisayan tongues, each of which has a variety of dialects. Half-castes, Indo-European and Indo-Chinese, engross much of the business and wealth of the islands. Spaniards are comparatively few. The independent tribes are partly Mohammedan and partly heathen. The largest town and chief seaport as well as the seat of government is Manila. The Philippines were discovered by Magellan in 1520–21. In 1762 Manila was taken and for a short time held by a British fleet. On May 1, 1898, during the war between the United States and Spain, an American fleet under Commodore Dewey attacked and destroyed the Spanish fleet, and on August 13 the city was taken. The natives, then in revolt against Spain, under Aguinaldo, continued in arms against the Americans and a war resulted which continued until March, 1901, when Aguinaldo was captured and the native troops dispersed. The treaty of peace with Spain had left the United States master of the Philippine archipelago, and since then that country has exercised a protective sovereignty over the islands, and has held out to the people a promise of self-government at such time and in such degree as they may prove themselves ready to assume the responsibility. To instruct the people in this direction a thorough system of free schools has been introduced, railroads are being built to develop the resources of the islands, and free trade with the United States has been granted. In addition to this a Philippine legislature was established in 1907, to instruct the people in the art of government and give them a voice in the control of their own affairs.

Philippones (fīl'ip-ponz), a Russian sect, formed in the seventeenth century, a branch of the Roskolnicians, and so named from its founder, Philip Pustoswiæt. They decline to serve as soldiers, refuse to take oaths, and use the liturgy of the ancient Russo-Greek Church.

Philippsburg (fil'ipz-burg), a town of Baden, on the right bank of the Rhine, 16 miles north of Carlsruhe, formerly a celebrated imperial fortress. In 1734 it was captured by the French under the Duke of Berwick (who lost his life here), and its fortifications were razed in 1800. Pop. about 2500.

Philips (fil'ipz), Ambrose, a poet and dramatic writer, born of a Leicester family in 1671; died in 1749. He was educated at St. John's College, Cambridge, and subsequently became one of the wits who frequented 'Button's' in London. As a Whig politician he obtained various lucrative posts from the House of Hanover, while as a poet he was ridiculed by Swift and Pope, receiving the nickname of 'Namby Pamby' (which has since formed a useful English adjective). He wrote six pastorals and three tragedies: the *Distrest Mother* (1712), taken from Racine; the *Briton* (1722); and *Humphrey, Duke of Glouecester* (1723).



FLOATING DRY DOCK DEWEY

This dry dock, which is capable of floating the largest battleship, was towed from Sparrows Point, Maryland, to Olangapo, Philippine Islands, a voyage of 13,000 miles. In operation, the dock is sunk by admitting water into its tanks until the ship can be floated in. The water is then pumped out and the dock with the ship inside rises to the proper level as shown.

Philips, JOHN, an English poet, born in Oxfordshire in 1676; died at Hereford in 1708. He was educated at Christ Church, Oxford, where he produced the *Splendid Shilling*, a burlesque poem in Miltonic blank verse. He subsequently wrote *Blenheim*, a poem in celebration of the Duke of Marlborough's victory; and *Cyder*, a work in imitation of Virgil's *Georgies*.

Philistines (fil-is'tīnz), the name of a Semitic people or race who inhabited the southern part of the lowlands of Palestine, from the coast near Joppa to the Egyptian desert south of Gaza. They occupied five chief cities (Ashdod, Gaza, Gath, Askelon, Ekron), and these formed a kind of confederacy under five lords or chiefs. Mention is made of this people in Genesis xxi, xxvi, but it was during the time of the Judges in Israel, and subsequently in the reigns of Saul and David, that the Philistines attained their highest power, and from

Philistine Prisoners.— Sculptures at Medinet Haboo.

the latter received their greatest defeats. In the wars between Assyria and Egypt the country of Philistia was subdued by Tiglath-Pileser (734 B.C.), but the Philistines still intrigued with Egypt, and made various revolts against Sargon and Sennacherib to assert their independence. During the Babylonian captivity they avenged themselves on their old enemies the Israelites (Ezekiel xxv, 15), but subsequently the two nations seem (Nehemiah xiii, 23), to some extent, to have fraternized. The origin of this race has been a question of much debate by Biblical critics.

Phillip (fil'ip), JOHN, painter, one of the greatest colorists of the British school, born at Aberdeen in 1817; died in 1867. After serving his apprenticeship as a house-painter, he received some slight instruction from a local artist, and began to paint portraits. The merit of these induced Lord Panmure to aid him (1836) in going to London, and in attending the schools of the Royal Academy. Two years later he returned to Aberdeen, his pictures at this portion of his career consisting mainly of portraits and subjects from Scottish life. In 1852 and 1856 he visited Spain, and he again returned to that country in 1860. While resident there he was greatly influenced by the works of the Spanish masters, and especially by those of Velasquez. His style completely changed, his subjects became Spanish, and his grasp of color, composition, and character vastly improved. It is his pictures of Spanish life that have made him famous. Among the more important are *Life among the Gipsies at Seville* (1853), *The Letter-writer of Seville* (1854), *Death of the Contrabandista* (1858), *A Spanish Volunteer* (1862), *Agua Bendita* (1863), *Chat Round the Brasero* (1866). In 1860 he painted for Queen Victoria *The Marriage of the Prineess.* Many of his works have been engraved.

Phillips (fil'ipz), ADELAIDE, singer, born at Stratford-on-Avon, England, in 1833; died in 1882. She was brought over to Boston at 7 years of age and made that city her permanent home. Her voice was a fine contralto. She made her début at the Boston Museum in 1843 as *Little Pickle.* In 1850 she went to Paris to study, sang in opera in Milan in 1854, and subsequently in New York and elsewhere.

Phillips, DAVID GRAHAM, novelist, born at Madison, Indiana, in 1867. He became an author in 1887 and produced numerous works, beginning with *The Great God Sueeess.* One of the latest was *The Hungry Heart* (1909). He was shot in New York by a lunatic, January 21, 1911.

Phillips, JOHN, geologist, born in 1800; died in 1874. He was instructed in geology by his uncle, William Smith, 'the father of English geology,' and spent many years in arranging museums and organizing scientific societies in Yorkshire towns; became professor of geology in Dublin (1844) and in Oxford (1856). His chief works are a *Guide to Geology* (1834), *Palæozoic Fossils of Cornwall, Devon, and West Somerset* (1841), *Manual of Geology* (1855), and *Life on the Earth* (1861).

Phillips, STEPHEN, English poet, born at Somerton, near Oxford, in 1868. In 1897 his *Poems* were crowned by the Academy. His plays include *Paolo and Francesea* (1899), *Herod* (1900), and *Nero* (1906).

Phillips, THOMAS, an English portrait-painter, born in 1770; died in 1845. In 1792 he exhibited some historical pieces, but soon after turned

his attention to portrait-painting. In 1808 he became a member of the Royal Academy, and in 1824 succeeded Fuseli as professor of painting. He published his *Lectures on the History and Principles of Painting* in 1833.

Phillips, WENDELL, orator and reformer, was born at Boston, Massachusetts, in 1811; died in 1884. He was educated at Harvard College, studied law, and was admitted to the bar in 1834. The persecution of the early abolitionists roused his active sympathy, and in 1837 he eloquently took his stand in favor of the abolition of slavery, being preëminently the orator of the movement. From that date until the Civil war he continued an earnest advocate of the abolition cause, declared that the Constitution was an unrighteous compact between freedom and slavery, and that a dissolution of the Union would be the most effectual mode of giving freedom to the slaves. He was also for many years an advocate of woman suffrage, prohibition, prison reform, and a greenback currency. Collections of his letters and addresses have been published.

Phillipsburg, a town of Warren county, New Jersey, on the Delaware River, opposite Easton, Pennsylvania, and on several railroads. It has extensive iron industries and manufactures of boilers, bridges, cement, and horseshoes, with silk and pulp mills, etc. Pop. 13,903.

Philo Judæus (fī′lō jū-dē′us), an Alexandrian Jew of the first century, of whom all that is known is that he belonged to a wealthy family, received a liberal education, and in 40 A. D. visited Rome as one of a deputation to ask the Emperor Caligula to revoke the decree which compelled the Jews to worship his statue. His very numerous writings (which are in Greek) include an account of the Mosaic narrative of the creation, allegorical expositions of other parts of Genesis, lives of Abraham, Joseph, and Moses, treatises on the Decalogue, Circumcision, Monarchy, First-fruits, Offerings, and other subjects.

Philology (fil-ol′ō-ji), or COMPARATIVE PHILOLOGY, a term commonly used as equivalent to the science of language, otherwise called *Linguistic Science*, or *Linguistics*. This science treats of language as a whole, of its nature and origin, etc., and of the different languages of the world in their general features, attempting to classify and arrange them according to such general features, and to settle in what relationship each stands to the others. The philologist as such does not study languages for practical purposes, or to be able to read and speak a number of them, though the more he is tolerably familiar with the better. He rather studies them in the way a naturalist studies a series of animals or plants, as if they were separate organisms each with a life and growth of its own. That every language has such a life and growth is true in a sense, for languages are continually in a state of change; yet a language is not to be regarded as an organism like a plant or an animal, but rather, to quote Professor Whitney, as an *institution*, an outcome of the needs of human beings for communication with their fellows. A language is a system of vocal sounds through which ideas are conveyed from person to person in virtue of the fact that certain ideas are attached or belong to certain sounds by a sort of convention or general understanding existing among those who use the language. That there is any natural law by which one idea belongs to one vocal sound rather than to another can hardly be affirmed in view of the fact that if we select any one idea we shall find that each of the thousand languages of the world expresses this idea by a different sound or group of sounds. Indeed, ideas can be conveyed otherwise than by vocal sounds, as witness the elaborate sign-language that has been developed in some communities, as also the finger-language of the deaf and dumb. We can even conceive that a language of hieroglyphics or written symbols might exist with no spoken language connected with it. We have, however, no knowledge of any such case, and, in fact, wherever man exists we find him making use of speech, which, indeed, is one of his most distinct and marked characteristics. As to the origin of language nothing is really known, although few doubt that it is an invention or acquisition of the human race, and not an original endowment. Any one, however, may believe if he pleases that man was created with a language and the faculty of making use of it already in his possession. If the other view is taken we must suppose that the earliest men had no language to start with, but that having suitable organs for speech they devised a language among themselves as a means of intercommunication, and we may conclude that the earliest attempts at speech were either in imitation of the different sounds heard in nature, or that they were based on the inarticulate utterances or cries by which human beings naturally gave vent to different emotions. But

however language originally arose, it is very certain that whatever language we speak has to be acquired from others who have already learned to speak it, and that those others have similarly acquired it from their predecessors, and so on backwards into the darkness of the remotest ages. Every language is thus at our birth a foreign language to all of us.

The science of philology is quite of modern origin, being hardly, if at all, older than the 19th century. Speculations on language and its nature were indulged in by the ancient Greeks; but as the Greeks knew little or nothing of any language but their own, they had not sufficient materials wherewith to construct a science of language. In later times materials became more abundant as scholars studied Hebrew, Greek, Latin, Arabic, etc.; but it was the introduction of Sanskrit to the western world, and its observed similarity in many respects to Greek that led to the establishment of philology on a true scientific basis, an achievement which was largely due to the labors of Bopp, Pott, Schleicher, and other German scholars. Yet though most valuable results have been obtained and a large number of languages have been studied and classified, much remains to be done, much remains uncertain and must always remain so. One great difficulty that the philologist has to grapple with is the want of historical documents to throw light on the history of the great majority of languages, as only a very few possess a literature dating from before the Christian era, and far the greater number have no literature at all.

To begin with our own language and its kindred tongues. Philology has succeeded in showing that the English language is one of a group of closely allied languages which are known by the general name of the Teutonic or Germanic tongues. The other languages of the group, some of which are more closely connected with English than the rest, are Dutch, German, Danish, Icelandic or Old Norse, Swedish, and Gothic, to which may be added, as of less importance and having more the character of dialects, Norwegian, Frisian, the Plattdeutsch or Low German of Northern Germany, and Flemish, which differs little from Dutch. The Teutonic tongues are often divided into three sections, based on closeness of relationship: the *High German*, of which the modern classical German is the representative; the *Low German*, including English, Dutch, Frisian, Plattdeutsch, and Gothic; and the *Scandinavian*, including Danish, Swedish, and Icelandic. Another division is into: *East Germanic*, including Gothic and Scandinavian, and *West Germanic*, including the others.

The evidence that all these languages are closely akin is to be found in the great number of words that they possess in common, in the similarity of their structure, their inflections, their manner of compounding words — in short, in their family likeness. This likeness can only be accounted for by supposing that these languages are all descended from one common language, the primitive Teutonic, which must have been spoken at a remote period by the ancestors of the present Teutonic peoples, there being then only one Teutonic people as well as one Teutonic tongue. In their earliest form, therefore, and when they began to be differentiated, these languages must have had the character of mere dialects, and it is only in so far as each has had a history and literature of its own that they have attained the rank of independent languages.

The rise of dialects is a well-known phenomenon, taking its origin in the perpetual change to which all languages are subject. A language that comes to be spoken over a considerable area and by a considerable number of persons — more especially when not yet to some extent fixed by writing and literature — is sure to develop dialects, and each of these may in course of time become unintelligible to the persons using the others, if the respective speakers have little intercourse with each other, being separated by mountain ranges, arms of the sea, or merely by distance. In this way is the existence of the different Teutonic tongues to be accounted for. A similar instance of several languages arising from one is seen in the case of Italian, French, Spanish, and Portuguese, all of which are descended from the Latin. Of the common origin of these we have, of course, direct and abundant evidence.

The Teutonic tongues, with the primitive or parent Teutonic from which they are descended, have been proved by the investigations of philologists to belong to a wider group or family of tongues, which has received the name of the Aryan, Indo-European, or (especially in Germany) Indo-Germanic family. The chief members of this family are the Teutonic, Slavonic (Polish, Russian, Bohemian), Lithuanian, Celtic (Welsh, Irish, Gaelic, etc.), Latin (or Italic), Greek (or Hellenic), Armenian, Persian, and Sanskrit. Just as the Teutonic tongues are believed to be the offspring of one parent Teutonic tongue, so this

parent Teutonic and the other members of the Aryan family are all believed to be descended from one primitive language, the Aryan or Indo-European parent-speech. The people who spoke this primeval Aryan language, the ancestors (linguistically at least) of the Aryan races of Europe and Asia, are believed by many to have had their seat in Central Asia to the eastward of the southern extremity of the Caspian Sea. This, however, is very problematical, and some philologists see reason to think that Europe may rather have been the original home of the Aryans. The latter view is now perhaps the one most generally held.

How remote the period may have been when the ancestors of the Teutons, the Celts, the Slavs, the Greeks, Romans, Persians, and Hindus were living together and speaking a common language is uncertain. Yet the general character of their language is approximately known, and philologists tell us with some confidence what consonant and what vowel sounds the Aryan parent-speech must have possessed, what were the forms of its inflections, and what, at the least, must have been the extent of its vocabulary, judging from the words that can still be traced as forming a common possession of the sister tongues of the family.

In order to understand how it is that many words in the different Aryan tongues are really of the same origin, though superficially they may appear very different, it is necessary to know something of *Grimm's Law*. This law, which, like a natural law, is simply a statement of observed facts, is so named from the great German philologist who first definitely laid it down as the result of observation and comparison of the relative linguistic phenomena. It concerns the so-called 'mute' consonants (*t*, *d*, *th*; *k*, *g*, *h* (*ch*); *p*, *b*, *f*), and takes effect more especially when these are initial. According to it, in words and roots that form a common possession of the Aryan tongues, being inherited by them from the parent-speech, where in English (more especially Anglo-Saxon) and in most of the Teutonic tongues we find *t*, *d*, or *th*, we find in Latin, Greek, and Sanskrit not these letters, but respectively *d* instead of *t*, an aspirated sound instead of *d*, and *t* instead of *th*. That is, an English *t* corresponds to a Latin, Greek, and Sanskrit *d*, as is seen in *tame;* compared with L. *domare*, Gr. *damaein*, Skr. *dam*, to tame; an English *d* corresponds to Latin *f*, Greek *th*, Sanskrit *dh*, as in E. *door*, L. *fores*, Gr. *thyra*, Skr. *dvāra* (for original *dhvāra*), a door; an English *th* corresponds to Latin, Greek, and Sanskrit *t*, as in *thin*, compared with L. *tenuis*, Gr. *tanaos*, Skr. *tanu*, from root *tan*, to stretch. If we next take the gutturals we find that English *k* (or *c* hard), *g*, *h*, correspond respectively in the above languages to *g*, *h* (*ch*, *gh*), *k*, as is seen in E. *kin*, L. *genus*, Gr. *genos*, Skr. *janas* (where *j* is for original *g*); E. *goose* (modified from original *gans*), compared with L. *anser* (for older *hanser*), Gr. *chēn*, Skr. *hansa;* E. *head* (A. Sax. *hcafod*), L. *caput*, Gr. *kephalē*, Skr. *kapāla*. Similarly *b* in English corresponds to *f* in Latin, *ph* in Greek, and *bh* in Sanskrit, as in *brother* = L. *frater*, Gr. *phratēr*, Skr. *bhratri*, a brother; *f* in English to *p* in Latin, Greek, and Sanskrit, as in *father* = L. *pater*, Gr. *patēr*, Skr. *pitri*, father. German exhibits certain letter-changes peculiar to itself, and for this reason is placed, in any full statement of Grimm's law, apart from the other Teutonic tongues. In German, for instance, *t* takes the place of an English *d*, as in G. *tag*, E. *day*, G. *teil*, E. *deal;* *d* the place of *th*, as in G. *ding*, E. *thing*, G. *drei*, E. *three*, etc. In some cases the law does not operate in consequence of the influence of other letters; thus the *s* of *stand* prevents the *t* from becoming *th*, as it ought to do to represent the *t* of L. *stare*, to stand. Certain other exceptions to the law are accounted for by a subsidiary law of more recent discovery than Grimm's law, known as *Verner's Law*, and formulating certain facts connected with the original accentuation of Aryan words.

The Aryan tongues, ancient and modern, are entitled to claim the first rank among the languages of the globe, both for richness, harmony, and variety, and more especially as embodying a series of literatures to which no other family of tongues can show a parallel. Next in importance come the *Semitic* tongues — Hebrew, Chaldee, Syriac, Arabic, etc. These, like the Aryan tongues, form a well-marked family, one notable peculiarity of which is the possession of 'triliteral' roots, or roots of which three consonants form the basis and give the general meaning, while inflection or modification of meaning is indicated by internal vowel-change. Thus the vowels play a subordinate part to the consonants, and do not, as in the Aryan tongues, associate with them on equal terms. Other important linguistic families are the *Hamitic*, which includes the ancient Egyptian, the Coptic, Berber, Galla, Somali, etc.; the *Turanian* or *Ural-Altaic*, which includes Turkish, Finnish,

ARCTIC OCEAN
GREENLAND
SPITZBERGEN
Barents Sea
FRANZ JOSEF LAND
ARCTIC CIRCLE
ALASKA
DOMINION OF CANADA
NORTH AMERICA
UNITED STATES
Bering Sea
ICELAND
BRITISH ISLES
NORWAY
SWEDEN
RUSSIA
RUSSIAN EMPIRE
EUROPEAN
ASIA
SIBERIA
GERMANY
FRANCE
PORTUGAL
SPAIN
ATLANTIC OCEAN
BERMUDAS
PACIFIC OCEAN
HAWAIIAN ISLANDS
TROPIC OF CANCER
MEXICO
CUBA
HAITI
WEST INDIES
CENTRAL AMERICA
COLOMBIA
VENEZUELA
GUIANA
EQUATOR
PERU
BOLIVIA
BRAZIL
SOUTH AMERICA
ARGENTINA
POLYNESIA
OCEANIA
TROPIC OF CAPRICORN
C. Horn
MOROCCO
ALGERIA
TUNIS
TRIPOLI
TURKEY
PERSIA
CHINESE EMPIRE
TIBET
RIO DE ORO
EGYPT
ARABIA
AFRICA
INDIA
SIAM
PHILIPPINE ISLANDS
MICRONESIA
GUINEA
LIBERIA
NIGERIA
SUDAN
ABYSSINIA
CEYLON
FRENCH CONGO
KONGO STATE
BRITISH EAST AFRICA
GERMAN EAST AFRICA
ANGOLA
RHODESIA
PORT EAST AFRICA
MADAGASCAR
CAPE OF GOOD HOPE
INDIAN OCEAN
SUMATRA
BORNEO
JAVA
NEW GUINEA
MELANESIA
AUSTRALIA
TASMANIA
NEW ZEALAND
ANTARCTIC OCEAN
ANTARCTIC CIRCLE
COMMERCIAL LANGUAGES OF THE WORLD
ENGLISH
GERMAN
FRENCH
PORTUGESE
SPANISH
DUTCH
SCANDINAVIAN
RUSSIAN
CHINESE
ARABIC
JAPANESE
ITALIAN
Hammond's 5 x 7 Map
Showing Commercial Languages of the World
Copyright, 1909 by C. S. Hammond & Co., N.Y.
C.S.HAMMOND & CO., N.Y.

Hungarian, Mongolian, etc.; and the *South-Eastern Asiatic*, which includes Chinese, Siamese, etc. The Turanian languages belong to the type known as *agglutinate* or *agglutinating*, being so called from the fact that the root always maintains a sort of independence or distinctive existence, the other elements of the word being more or less loosely 'glued' or stuck on, as it were. The Chinese is the chief of the *monosyllabic* languages, so called from their words consisting normally of monosyllables. Other families of languages are the Malayo-Polynesian of the Indian Archipelago and Pacific; the Bântu, a great family of S. Africa; and the American Indian languages, the latter characterized as *polysynthetic*, from the way in which they crowd as many ideas as possible into one unwieldy expression. All these families form groups, so far as is known, separate from and independent of each other; and attempts to connect any two of them, as Aryan and Semitic for instance, have met with little success. Formerly etymologists had no hesitation in deriving English words from Hebrew roots, but this was in the days when there was no science of comparative philology. That all languages are descendants of one original tongue, as is believed by many, linguistic science can neither affirm nor deny, though the evidence does not sustain it. We may add that community of language is not a proof of community of race, since it is well known that, as the result of war or otherwise, races have given up the language that once belonged to them and adopted some other.

Philomela (fil-o-mē'la), in mythology, a daughter of Pandion, king of Athens, who being violated and deprived of her tongue by Tereus, the husband of her sister Progne, made known her wrong to the latter by embroidering it in tapestry. In revenge the sisters murdered Itys, the son of Progne by Tereus, and served him up to his father. Tereus pursued them, but they were changed by the gods into birds, Philomela and Progne into a nightingale and a swallow, and Tereus into a lapwing.

Philopœmen (fil-o-pē'men), an ancient Greek patriot and commander, born at Megalopolis, in Arcadia, about B. C. 252. Having distinguished himself in war against the Spartans, he was, in 208 B. C., appointed commander-in-chief of the forces of the Achæan League. He reorganized the Achæan army, defeated and slew with his own hand Machanidas, tyrant of Sparta, and subsequently defeated Nabis, the successor of Machanidas. He induced the Spartans to join the Achæan League; but, soon becoming dissatisfied, they separated from the confederacy, and called in the Romans to their assistance. Philopœmen, as commander of the Achæans, declared war against Sparta, and, having taken the city, treated it with the greatest severity. The Romans, however, interfered, and Sparta was again admitted into the confederacy as an independent state. Messene now revolted, and Philopœmen, though broken by infirmity and disease, drove back the insurgents, but was afterwards taken prisoner, carried in chains to Messene, and compelled to drink poison, B. C. 183.

Philosopher's Stone. See *Alchemy.*

Philosophy (fil-os'u-fi; Greek, *philosophia*, love of wisdom), a term first brought into general use by Socrates. Philosophy is the science that deals with the general principles which form the basis of the other sciences, and of which they themselves take no cognizance. It follows up the data of experience to their ultimate grounds, regarding each particular fact in relation only to a final principle, and as a determinate link in the system of knowledge. In this view philosophy may be defined as the science of principles.

For all practical purposes the history of philosophy may be treated as commencing with the Greeks, the philosophic notions of the inhabitants of the East being considered merely as introductory to the Greek philosophy, in which many oriental notions were incorporated. The first problem of Greek philosophy was to explain the enigma of external nature, to solve the problem not of the soul but of the world. Thales (about 600 B. C.) stands at the head of the Ionian school, which, with the Eleatic school, was the chief representative of speculative thought in pre-Socratic times; the former of these schools being characterized by Aristotle as seeking to find a material, the latter a formal principle of all things. The material principle sought by the Ionian school was assumed to be water by Thales, a primitive infinite but undetermined matter by Anaximander, and air by Anaximenes. The Pythagoreans, abstracting from the quantitative rather than the qualitative character of matter, substituted a symbolic principle — number — for the sensuous principle; but the Eleatics, transcending alike the sensuous principle of the Ionics and the quantitative principle of the Pythagoreans, conceived of pure being as the one sole substance, the phenomenal world being

viewed as unreal. The three great philosophers of this school are Xenophanes, its founder, Parmenides, and Zeno. The transition from abstract to concrete being, from the Eleatic principle of unity to the world of phenomena, was attempted by Heraclitus (about 520 B. C.), who asserted for an absolute principle the unity of being and non-being — becoming. According to him all things are in constant flux, the product of conflicting opposites, of the One at once warring and harmonizing with itself. Empedocles (440 B. C), in attempting to solve the reason of this flux, advanced the theory that matter was the principle of permanent being, while force was the principle of movement. The two moving forces in his system were love and hate. According to the Atomists, on the other hand, who are represented by Leucippus and Democritus (450 B. C.), the moving forces became an unintelligible necessity giving form to the world. Anaxagoras (born about 500) asserted reason as the principle, and though he did not develop his theory to any extent, the mere expression of a spiritual principle is sufficient to mark it as forming an era in philosophy. In the hands of the Sophists this principle, in the sense of individual reason, became the occasion of their denial of all objective reality. In Socrates (470–399 B. C), who united scientific method and a high ethical and religious spirit, the destructive teaching of the Sophists found its keenest opponent. What are called the minor Socratic schools — the Cynics, Cyrenaics, and Megarians — severally professed to regard Socrates as their founder, the Cynics, however, defining the end of action as self-sufficiency, the Cyrenaics as pleasure, and the Megarians as reason. With Plato (430–347) philosophy lost its one-sided character. Though professedly a disciple of Socrates his system of idealism is his own. The Platonic idea is the pure archetypal essence, which is the source of all the finite realities that correspond to it. The visible world is an inferior reproduction of the world of pure ideas, where shine in all their splendor the good, the true, and the beautiful. In logic Plato brings back science to general ideas. In ethics the highest end of man is regarded as the unity of his nature. Plato's ideal theory is criticized by Aristotle, because he gives no real explanation of the connection between the phenomenal and the ideal. In Aristotle's own system, instead of beginning with the general and the absolute, as Plato had done, he begins with the particular and individual. His whole philosophy is a description of the given and empirical; and his method is induction. His system presents us with a number of coördinate sciences, each having its independent foundation, but no highest science which should comprehend them all. The three schools of Greek philosophy which followed the systems of Plato and Aristotle, and which mark the declining days of Greece, are those of the Stoics, Epicureans, and Skeptics. Rome had no philosophy properly its own; the universal character of Roman philosophizing was eclecticism, of which Cicero was the most illustrious representative. In Alexandria eastern and western philosophy, as also Judaism, Christianity, and Paganism, came into contact. Neo-Platonism, founded by Ammonius Saccas (A. D. 193), strove to combine, in opposition to Christianity, the chief elements of classical and eastern speculation. Hellenic ideas were mingled with a vague symbolism, and with theories of ecstasy and divine union. Christianity, in the apologists of the 2d century and the Alexandrine fathers, related itself very early to the philosophy of the time, but not until about the 11th century did there begin to manifest itself a distinctive Christian philosophy in scholasticism, which, assuming the dogmas of the church to be absolutely true, sought to justify them to the reason in abundant tomes of opposite opinions of little philosophical importance.

Modern philosophy, which begins with the 15th century, is characterized by a freer, more independent spirit of inquiry. First the scholastic philosophy was attacked by those who called to mind the ancient Greek philosophy in its original purity. After this struggle new views were presented. Bacon and Locke on the one hand, and Descartes on the other, stand respectively at the head of the two systems — empiricism and idealism, which begin modern philosophy. Bacon created no definite system of philosophy, but gave a new direction to thought, the empiricism which he founded finally developing into skepticism. The system of Descartes was opposed by Gassendi, and received modifications at the hands of others, especially Malebranche. The most important successor, however, of Descartes was Spinoza, who reduced the three Cartesian substances to unity, to one infinite original substance, the ground of all things, that excludes from itself all negation or determination, and is named God or nature. Locke (1632–1704), who had a precursor in Hobbes (1588–1679), the influence of whom,

however, chiefly concerned the history of political science, is regarded as the father of modern materialism and empiricism. As occupying the general position of Locke mention may be made of Isaac Newton, Samuel Clarke, William Wollaston, the Earl of Shaftesbury, and Francis Hutcheson. The philosophy of Locke received a further development in France, where Condillac sought to explain the development of humanity by the simple development of the sensations. Then followed the materialism of Helvetius, d'Holbach, La Mettrie, and others, including several of the Encyclopedists. In opposition to this materialistic tendency arose the idealism of Leibnitz and Berkeley. The theories of Leibnitz were systematized by Wolff, and from his time to Kant German philosophy assumed no new standpoint. Berkeley (1684–1753), founding on Locke's principle that we are percipient of nothing but our own perceptions and ideas, argued that the existence of bodies out of a mind perceiving them is impossible, and a contradiction in terms. Granting the premises of Berkeley, his conclusions could not be refuted; but it was reserved for Hume to trace out the ultimate consequences of the Cartesian and Lockian philosophy, and thus, though unintentionally, by a sort of *reductio ad absurdum*, to produce the great metaphysical revolution of which Reid and Kant were the first movers. The Scottish or 'common sense' school of philosophy, with Reid (1710–96) at its head, has the merit of having first strongly inculcated the necessity of admitting certain principles independent of experience, as the indispensable conditions of thought itself. Reid therefore directed his inquiries to an analysis of the various powers and principles of our constitution, in order to discover the fundamental laws of belief which form the groundwork of human knowledge. Dugald Stewart, with some deviations, followed in the track of his master; but Thomas Brown departed on many points of fundamental importance from Reid's philosophy. The same occasion that gave rise to the Scottish school also produced the philosophy of Immanuel Kant. Kant (1724–1804), who may be justly regarded as the father of the philosophy of the 19th century, sought to bring together into unity the one-sided endeavors of his predecessors in the realistic and idealistic schools. He took up a critical standpoint, and from it instituted an inquiry into the origin of our experience or cognition. (See *Kant.*) The ablest opponent of the Kantian philosophy, Jacobi, took the standpoint of faith in opposition to that of criticism, in order to give theoretic certainty to the postulates of the practical reason. In the hands of Fichte the critical idealism of Kant becomes absolutely subjective idealism. 'All that is, is ego'; this is the principle of the Fichtian system; the world is merely phenomenal, consciousness is a phenomenon, perception is a dream. Fichte's subjective idealism found its continuation in the objective idealism of Schelling and the absolute idealism of Hegel, Schelling (1775–1854) started from the ego of Fichte, and by a combination of the doctrine of the ego with Spinozism transformed it into the system of identity. Object and subject, real and ideal, nature and spirit, are identical in the absolute, and this identity we perceive by intellectual intuition. Schelling subsequently, by successively incorporating into his system various opinions from Bruno, Böhme, and others, developed a syncretistic doctrine which constantly approximated to mysticism. Hegel (1770–1831), developed this principle of identity, created the system of absolute idealism. In his philosophy he aims at elevating consciousness to the standpoint of absolute knowledge, and systematically developing the entire contents of this knowledge by means of the dialectical method. Schleiermacher (1768–1834) promulgated an eclecticism to which Plato, Spinoza, Kant, and Shelling were the chief contributors. Schopenhauer (1788-1860) developed a doctrine which may be described as a transitional form from the idealism of Kant to the realism at present prevalent. In opposition to Fichte's subjective idealism, and to Schelling's renewed Spinozism, Herbart (1776–1841) developed a philosophic scheme on the basis of the realistic element in the Kantian philosophy, as also of Eleatic, Platonic, and Leibnitzian doctrines. After the death of Hegel, Feuerbach, Richter, Strauss, Arnold Ruge, and others developed, in an extreme manner, Hegelian thought, and recently Hegelianism has counted more adherents than any other system. Next to it has stood the Herbartian school; and more recently the modification of systems through a return to Aristotle or Kant, and the study of philosophy upon its historic side, have occupied the larger number of minds. While resting in part upon the basis of the doctrines of earlier thinkers, Trendelenburg, Lotze, and others have advanced in new and peculiar paths. In France two philosophical tendencies op-

posed the sensualism and materialism so universal at the beginning of the century. Of these the one was theosophical and the other found expression in the eclectic and spiritualistic school founded by Royer-Collard as the disciple of Reid, and further built up by Cousin, who incorporated into its body of doctrines a number of German philosophical notions. Jouffroy attempted to unite the philosophy of his predecessor Maine de Biran to that of the Scottish school, and became associated with the spiritualistic school, to which also belong the names of Garnier, Janet, Rémusat, Franck, Jules Simon, and others. This school has contended valiantly against the pantheistic tendencies of the age. Independent systems are those of Pierre Leroux, Lamennais, Jean Reynaud, and Buchez. Materialism has its supporters in Cabanis, who sees in thought only a secretion of the brain, Broussais, Gall, and others. Positivism, founded by Auguste Comte, numbers not a few followers.

In Great Britain the Scottish school had later exponents in Sir James Mackintosh (1765–1832) and Sir William Hamilton (1788–1856), the last-named largely influenced in some points of his psychology by Kant. Mansel may be mentioned as a disciple of Hamilton. Ferrier (1808–64) assumed a polemical attitude towards the common-sense school in respect of its fundamental peculiarity, as he viewed it, of absorbing philosophy into psychology, as well as on minor details of the system. The associational psychology of Hartley, Priestley, and Dr. Darwin found representatives in the 19th century in James Mill (1773–1836) and his son John Stuart Mill (1806–73), who make the principle of association the sole explanation of psychical phenomena. Bain, Grote, and Lewes followed more or less in the same track. Herbert Spencer attempted, and with much success, to widen the general principles of science and philosophy into a universal doctrine of evolution. Among the chief leaders of philosophic thought opposed to the English school of empiricism may be mentioned the names of the late T. H. Green, Hutchison Stirling, and Edward Caird. In America, as in England, philosophy has been prosecuted more as an applied science, and in its special relations to morals, politics, and theology. Speculation there has been widely influenced by Scottish philosophy. Among the best-known names of transatlantic philosophical writers are those of Jonathan Edwards, Ralph Waldo Emerson, Henry P. Tappan, Francis Wayland, and others. A modified scholasticism, mostly Thomism, prevails in the Catholic seminaries of France, Spain, and Italy. In most of the continental countries German philosophy has exerted no small influence. In Italy a peculiar philosophical school, represented by Rosmini, Mamiani, and Gioberti, flourished during the 19th century.

Philostratus (fil-os′tra-tus), Flavius, a Greek writer born at Lemuos about the middle of the 2d century of our era. He taught rhetoric at Athens and subsequently at Rome, where he obtained the favor of the emperor Septimius Severus, and he accompanied the empress Julia Domna in her travels. His principal work is his *Life of Apollonius of Tyana*, supposed by some critics to be a parody on the Gospels. His other works are the *Heroiea*, a history in dialogue of the heroes of the Trojan war, *Lives of the Sophists*, *Letters*, etc.

Philter (fil′tėr), a potion supposed to have the power of exciting love. The preparation was frequently associated with magic rites, and the ingredients were frequently of a harmless, fanciful, or disgusting kind. At times, however, poisonous drugs were employed, the death of Lucretius and the madness of Caligula being alike ascribed to philters administered by their wives.

Phlebitis (fle-bī′tis; Greek, *phleps*, *phlebos*, a vein), inflammation of the veins. It may affect any of the veins of the body, but more usually manifests itself in the parts of the veins in the vicinity of wounds. The disease is indicated by great tenderness, tension, acute pain, and a knotted, cord-like swelling or hardness in the course of a vein or veins, sometimes attended, when the veins are superficial, with discoloration. In many instances the inflamed veins secrete pus, and if an artificial issue is not given to it the matter makes its way into the adjoining cellular tissue and forms abscesses, when it is peculiarly dangerous. The causes of the disease are numerous, but usually consist of external injuries of various kinds. Women are peculiarly liable to this disease after parturition.

Phlebotomy (fle-bot′u-mi; Greek, *phleps*, *phlebos*, a vein, and *temnein*, to cut), or Venesection, the act of letting blood by opening a vein; a method of treatment formerly applied to almost all diseases, but now chiefly confined to cases of general or local plethora. Another mode of letting blood is by cupping or by the application of leeches. It has been one of the

processes of the medical profession from the earliest times.

Phlegethon (fleg′e-thon), in the Grecian mythology, a river of fire in the infernal regions.

Phlegmasia (fleg-mā′si-a), PHLEGMON, in medicine, a diffuse inflammation of the subcutaneous connective tissue in which the pus has a tendency to spread itself through the tissues. The name *phlegmasia dolens* is given to what is otherwise known as *milk-leg*, an ailment occurring in women after delivery, and consisting in a very painful swelling of the leg accompanied by fever.

Phlogiston (flu-jis′tun), a name applied, before the time of Lavoisier, to a hypothetical substance supposed to be contained in all combustible bodies, and constituting the source or element of heat.

Phloridzin (flor-id′zin), a glucoside obtained from the root of the apple, pear, cherry, etc. It destroys the malarial parasite and is recommended as an antiperiodic in malaria, but its chief medical use is in testing the functional activity of the kidneys; it producing glycosuria of renal origin, in addition to polyuria.

Phlox (floks), a genus of perennial herbaceous plants of the natural order Polemoniaceæ, natives for the most part of North America, though some of the species are to be met with in Asia. The flowers, which are favorites in gardens, are of a purple or violet color, more rarely white or red, with a salver-shaped corolla, and a narrow sub-cylindrical tube longer than the calyx. The trailing kinds are excellent for rock-work.

Phoca, PHOCIDÆ. See *Seal.*

Phocas (fō′kas), a Greek emperor, born in the 6th century, A. D., of obscure parentage, entered the army in the reign of Mauricius, and rose to be a centurion. At the head of a mutinous army he marched from the Danube to Constantinople, and on the flight of Mauricius took possession of the throne, 602 A. D. The subsequent murder of Mauricius and his family involved him in a war with Persia. He was captured and put to death in 610 by Heraclius the younger and Nicetas, who besieged Constantinople at the head of an expedition fitted out by Heraclius, exarch of Africa.

Phocion (fō′shi-un), an Athenian general, and one of the most virtuous characters of antiquity; supposed to have been born about B. C. 402. In the war with Philip of Macedon the Athenians sent Phocion with some troops to Eubœa, where he obtained a complete victory over the enemy. Some time after he was despatched to assist the cities of the Hellespont against Philip, whom he compelled to retire. According to Plutarch he was nominated commander forty-five times without once applying for the office. He always led a simple life, and cultivated his small farm with his own hands. As the leader of the conservative or aristocratic party he opposed Demosthenes on the question of war with Philip of Macedon, his advice, according to Grote, being eminently mischievous to Athens. He subsequently condemned the confederacy against Alexander the Great, and, after Alexander's death (323 B. C.), the war with Antipater. On each occasion Phocion was employed to make terms with the victorious Macedonians; and though he seems to have used his influence with them to mitigate the burdens upon his country, his conduct readily laid him open to a charge of betrayal. He was accordingly put to death by the popular party in 317 B. C., but his remains were shortly afterwards buried at public expense and his accusers punished.

Phocis (fō′sis; Greek, *Phōkis*), a division of ancient Greece, on the north side of the Gulf of Corinth, between Bœotia on the east and Doris and the Locri Ozolæ on the west. The principal rivers were the Cephissus and Plistus, and the principal mountain Parnassus, on which was situated Delphi with its celebrated oracle. The country is mountainous and unproductive, the valley of the Cephissus being almost the only fertile tract in it. The Phocians were a brave and industrious people, and subsisted chiefly by agriculture. See *Phthiotis.*

Phœbus. See *Apollo.*

Phœnicia (fē-nish′i-å), in ancient geography, a country on the coast of Syria, bounded on the east by Mount Lebanon, and containing the celebrated cities Tyre and Sidon. Phœnicia proper was a tract of country stretching along the eastern shore of the Mediterranean, not much more than 28 miles in length, and little more than 1 mile in average breadth; Sidon being situated near its northern, and Tyre not far from its southern boundary. In a wider sense Phœnicia was regarded as beginning on the north with the Island of Aradus, and extending south to the town of Dora, a little below the promontory of Carmel, being about 120

miles in length, and rarely more than 20 in breadth. It is watered by several streams flowing from Lebanon to the sea, such as the Eleutherus, the Adonis, the Lycus, the Tamyras, the Leontes. The country is fertile in timber, corn, fruits, etc.; and besides the great cities of Sidon and Tyre, it was anciently studded with numerous smaller towns, forming almost an unbroken line along the coast. Among these towns in earlier times were Arvad, Accho, Arka, Tripolis, Berytus, Sarepta, Dora, etc. Many of the roadsteads or harbors were excellent, but are now silted up.

The question as to the original seat of the Phœnicians has received no satisfactory solution; but that, like the Jews, they were Semites by race, is well known. Their immigration to the coast of the Mediterranean belongs to prehistoric times. The settlement of Israel in Canaan did not produce any great or permanent change on Phœnicia. The tribes of Naphtali, Asher, and Dan, to which it was assigned, did not conquer Phœnicia, but occupied only a small portion of it; and the subsequent relations of Israel and Phœnicia were for the most part those of amity, intercourse, and reciprocal advantage. The wealth and power of the Phœnicians arose from their command of the sea, and it was their policy not to provoke any of the nations to the east of them, and not to quarrel unnecessarily with Israel, which was their granary. The relation between Hiram and David was probably but a sample of such international treaties and intercourse. After the division of the Hebrew kingdom Phœnicia would naturally cultivate alliance with the Ten Tribes nearest to it, and Ahab married a Phœnician princess. The country was afterwards successively incorporated in the Assyrian, Babylonian, and Persian empires, but the cities retained more or less their independence. It was next conquered by Alexander the Great, and henceforth simply formed part of Syria.

From a very early period the Phœnicians occupied themselves in distant voyages, and they must speedily have reached to a style of substantial shipbuilding. Xenophon passes a high eulogy on a Phœnician ship; and they were skilled in navigation and the nautical applications of astronomy. Lebanon supplied them with abundance of timber, and Cyprus gave them all necessary naval equipments, from the keel to the top-sails. In the reign of Pharaoh-Necho these daring navigators even circumnavigated Africa, and the Phœnicians furnished Xerxes with 300 ships, which took part in the battle of Salamis. The commerce of Tyre extended widely. It traded in the produce of the whole known world, from the ivory and 'bright iron' and ebony and cotton fabrics of India to the tin from Cornwall and Devonshire. Fishing was also an important industry, and the Tyrians sold fish in Jerusalem. The Phœnicians excelled in the manufacture of the purple dye from the shell-fish *murex*, abundant on its coasts. The glass of Sidon was no less famous than the Tyrian dye. Phœnicia produced also articles of silver and gold as well as of brass; its inhabitants were also skilled in architecture and in mining.

The maritime knowledge and experience of Phœnicia led to the plantation of numerous colonies in Cyprus, Rhodes, and the islands of the Ægean — the Cyclades and Sporades — in Sicily, in Sardinia, the Balearic Islands, and in Spain. The most celebrated of the Phœnician colonies, however, was Carthage, in Northern Africa, which extended its sway over the Spanish peninsula and disputed with Rome the supremacy of the Mediterranean.

As was the case in Canaan at the invasion, each Phœnician city was governed by a king or petty chief. A powerful aristocracy existed in the chief towns, and there were also elective magistrates, called by the Romans *suffētes*, a disguised form of the Hebrew *soffet*. Sidon, and afterwards Tyre, exercised a hegemony over the other states. The relation of Phœnicia to her colonies does not seem to have been very close. Their religion, however, bound the mother country and the colonies in a common worship. Carthage often sent presents to the chief Phœnician god; so did Gades and other settlements.

The religion of the Phœnicians was a species of nature-worship, the objects of adoration being the sun, moon, and five planets; or in another form it was the worship of male and female reproductive powers — the former represented as Baal and the latter as Baalith, Astoreth, or Astarte. The god called Il, a sort of Phœnician Cronos or Saturn, resembling the Moloch or Milcom of the Ammonites, had human sacrifices offered to him. Marine deities must have held a prominent place in their theogony — deities corresponding to the Greek Nereus and Poseidon, which last was worshiped at Berytus. In the oldest temples there were no images, but there were rude fetishes — conical or oblong stones, possibly aerolites 'fallen from heaven,' and fossil belemnites.

While the wealth and commerce of Phœnicia must have brought art and refinement, the people were noted for their dissoluteness. As a people the Phœnicians early obtained a reputation for cunning and faithlessness. They were often pirates; they were certainly slave-traders. They purchased slaves from the northern shores of the Black Sea, and they also kidnaped and sold the children of Israel — a practice which brought upon them the denunciations of the prophets, and a just retaliation was predicted to fall upon them.

The language of ancient Phœnicia was closely akin to Hebrew. The famous passage in the Pœnulus of Plautus illustrates the assertion. Of ninety-four words on a tablet discovered at Marseilles in 1845 relating to the sacrificial ritual no less than seventy-four are found in the Old Testament. Coins and seals also disclose the same affinity, as do the numerous inscriptions. Proper names can all be explained in the same way. The invention of letters is often ascribed to the Phœnicians, being probably derived from the hieroglyphics of Egypt, some of which were alphabetic in significance. The Greeks believed that letters had been brought to them from Phœnicia by Cadmus. The so-called Cadmean letters of the Greek alphabet are Α Β Γ Δ Ε F Ι Κ L Μ Ν Ο Π Ρ Σ Τ, the sixth letter F being the *digamma*, which afterwards disappeared from the Greek alphabet. The names of these letters have no meaning in Greek, but they have each a significance in Phœnician or Hebrew. The affinity of the old Greek letters in form to the Phœnician and early Hebrew can be easily traced. The literature of Phœnicia has perished. See also *Tyre*, *Sidon*, *Carthage*, etc.

Phœnicop'terus. See *Flamingo*.

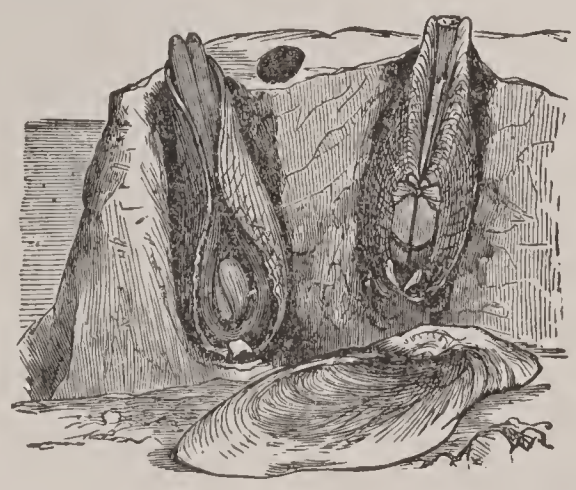
Phœnix (fē'niks), a fabulous Egyptian bird, about the size of an eagle, with plumage partly red and partly golden. Of the various stories told of it by Herodotus and others, the most popular is to the effect that the bird, at an age of 500 years, conscious of its approaching death, built a funeral pile of wood and aromatic gums, which it lighted with the fanning of its wings, and rose from the flames with a new life.

Phœnix, the scientific name of the date-palm genus.

Phœnix, a city of Arizona, and its capital since 1890; also the county seat of Maricopa Co., 226 miles N.E. of Yuma, on the Southern Pacific and other railroads. It is an important distributing center, being in a mining and agricultural region. It has iron-works, flour mills, etc., and is a winter resort. Pop. 11,134.

Phœnixville, a borough of Chester Co., Pennsylvania, on the Schuylkill River at the mouth of French Creek, 28 miles N.W. of Philadelphia. It contains iron-works of great extent, among the largest in the United States. They produce steel bridges, architectural and structural iron, rails, boilers, etc. There are also silk-mills, stocking-factories, etc. Pop. 10,743.

Pholas (fō'las), a genus of marine Lamellibranchiate bivalves, forming the type of the family Pholadidæ, in which the shell gapes at both ends. The shell, which is of thin white texture, is studded over on its outer surface with numerous rasp-like prominences by means of which the animal excavates, burrows in wood, rocks, indurated clay,

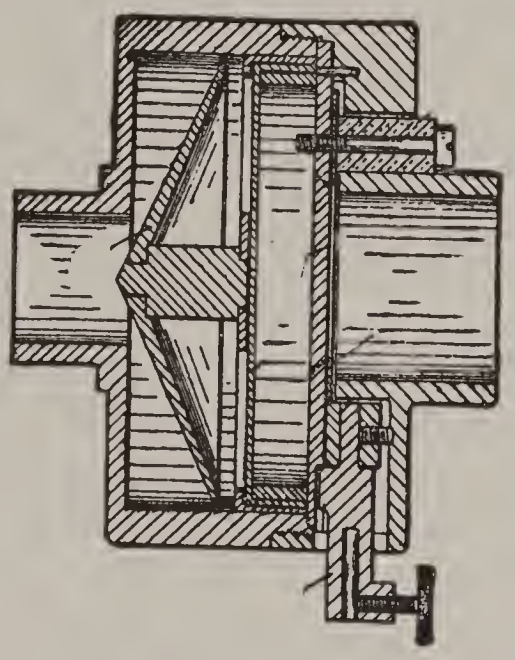


Pholades (*Pholas Dactylus*) in their holes.

etc., maintaining communication with the outer world by means of long breathing-tubes or siphons with fringed edges. They are popularly known as 'piddocks,' and are eaten on many parts of the British coasts. These molluscs appear to possess the power of emitting a phosphorescent light, *P. Dactylus*, the common species, being specially noted on this account.

Phonetics (fō-net'ikz), the science which treats of the various sounds pertaining to human speech, their distinctive characteristics, the voice-mechanism by which they are uttered, and the methods by which they may be best represented to the eye. Any system of writing is strictly phonetic when by it each different sound is represented by a different character, and the same sound always by the same character.

Phonograph (fō′nu-graf), an instrument by means of which sounds can be permanently registered, and afterwards reproduced from the register. It consists essentially of a curved tube, one end of which is fitted with a mouthpiece, while the other end (about 2 inches in diameter) is closed in with a disk or diaphragm of exceedingly thin metal. Connected with the center of this diaphragm is a steel point, which, when the sounds are projected on the disk from the mouthpiece, vibrates backwards and forwards. This part of the apparatus is adjusted to a cylinder which rotates on a horizontal axis. On the surface of the cylinder is cut a spiral groove, and on the axis there is a spiral screw of the same pitch, which works in a nut. When the instrument is to be used a piece of tin-foil is



Pneumatic Sound-box of Talking Machine.

gummed around the cylinder, and the steel point is adjusted so as to be just touching the tin-foil, and above the line of the spiral groove. If some words are now spoken through the mouthpiece, and the cylinder kept rotating either by the hand or by clock-work, a series of small indentations are made on the foil by the vibratory movement of the steel point, and each of these markings has an individual character of its own, due to the various sounds addressed to the mouthpiece. The sounds thus registered are reproduced by approaching the diaphragm and its steel point towards the tin-foil at the point where it was when the cylinder originally started, and then once more setting the cylinder in motion. The indentations previously made now cause the steel point to rise or fall or otherwise move as the markings pass under it, and the result is that the diaphragm is thrown into a state of vibration exactly corresponding to the movements induced by the markings, and thus affects the air around so as to produce sounds, and these vibrations being exactly similar to those originally made by the voice, necessarily reproduce these sounds to the ear as the words at first spoken. These marked strips of foil may be posted to any person with whom the speaker wishes to correspond, and who must, of course have a machine similar to that of the sender. The contents of the strips may be reproduced at any length of time, and repeated until the markings become effaced. In Edison's improved phonograph, tubes of wax are used instead of tin-foil, the tubes fitting the cylinder, and the markings being made on the surface of the wax by a fine steel point. The wax cylinders can be shaved by a small tool fitted to the machine and used several hundred times. The machine has also been improved by fitting a small electric motor, with a delicate governing device, as motive power. In case electric current is not available, spring motors of ingenious design are used. Machines of this type using wax records have been employed with signal success in business, for the purpose of taking dictation and reporting. By electrotyping and other processes, it is possible to reproduce records in hard rubber which may be used many times without injury. This method is used in the preparation of records of music, dialogues, etc., of which duplicates are desired. Automatic phonographs are to be found in many amusement places, equipped with musical records, which may be operated by the coin-in-the-slot system. Perhaps the most valuable application of the phonograph is in the preservation of sounds impossible to duplicate, such as voices of great singers, the languages of American tribes rapidly becoming extinct, and the words of speakers, faithful in accent and individuality, for future generations.

Phonography (fō-nog′ra-fi), a system of writing by which the sounds of a language are accurately represented. The name is generally applied to Pitman's system of shorthand. See *Shorthand.*

Phonolite (fō′nō-līt), volcanic rock, related to the trachytes.

Phonometer (fō-nom′e-tėr), an instrument for ascertaining the number of vibrations of a given sound in a given space of time.

Phorminx (for′minks), an ancient Grecian lute or lyre.

Phormium. See *Flax, New Zealand.*

Phosphate (fos′fāt), in chemistry, the generic term for the salts formed by the union of phosphoric anhydride with bases or water or both. They play a leading part in the chemistry of animal and plant life, the most important in this connection being the phosphate of soda, phosphate of lime, and the basic phosphate of magnesia. In agriculture the adequate supply of phosphates to plants in the form of manures becomes a matter of necessity in all deplenished soils. These phosphatic manures consist for the most part of bones, ground bones, mineral phosphates (apatite, phosphorite, coprolites), basic slag, superphosphates and reduced superphosphates (both prepared by treating broken-up bones with vitriol), bone-ash and phosphatic guano. See also *Manures.*

Phosphate-rock, called also marl rock, and bone phosphate. This material has been found in large quantities in South Carolina, and Florida, and ground for sale as a fertilizer. Though mines of this rock are found elsewhere, those named are much the richer. The phosphate-rock belongs to the Eocene formation, though found in post-pliocene basins. It is composed of the remains of fossilized animals, is rich in phosphates and forms an excellent fertilizing material.

Phosphides (fos′fīdz), compounds of phosphorus with one other element, more especially with the metals.

Phosphor-bronze. See *Bronze.*

Phosphorescence (fos-for-es′ens), the property which certain bodies possess of becoming luminous without undergoing obvious combustion. It is sometimes a chemical, sometimes a physical, action. Certain mineral substances exhibit the phenomenon when submitted to insolation, to heat, to friction, to electricity, or to cleavage. Rain, water-spouts, and meteoric dust sometimes present a self-luminous appearance. Several vegetable organisms, chiefly cryptogams, exhibit this kind of luminosity; but the most interesting cases of phosphorescence occur in the animal world, the species in which the luminous property has been observed belonging nearly to every main group of the zoölogical series. In some of the lowest life forms and in many of the jelly-fishes the whole surface of the body is phosphorescent; in other organisms the phosphorescent property is localized in certain organs, as in the sea-pens, certain annelids, the glow-worms, fireflies, etc., while many deep-sea fishes have shining bodies embedded in the skin. The phosphorescence of the sea is produced by the scintillating or phosphorescent light emitted from the bodies of certain microscopical marine animals, and is well seen on the surface of the ocean at night. It is an interesting fact that phosphorescence is a common feature in the deep-sea animals, which dwell in complete darkness except to the extent that they are themselves able to illuminate their place of abode. Phosphorescence in animals appears to be a vital process, consisting essentially in the conversion of nervous force (vital energy) into light; just as the same force can be converted by certain fishes into electricity. See *Fluorescence.*

Phosphoric Acid (fos-for′ik) PH_3O_4), an acid usually obtained by burning phosphoreted hydrogen in atmospheric air or oxygen. It is also produced by the oxidation of phosphorous acid, by oxidizing phosphorus with nitric acid, by the decomposition of apatite and other native phosphates, and in various other ways. It is used in medicine in the form of solution, constituting the dilute acid of the pharmacopœia. It is peculiarly suited to disordered states of the mucous surfaces, and also to states of debility, characterized by softening of the bones.

Phosphorite (fos′for-īt), a species of calcareous earth; a subspecies of apatite (which see). It is an amorphous phosphate of lime, and is valuable as a fertilizer.

Phosphoroscope (fos-for′o-skōp), an instrument designed to show the phosphorescence of certain bodies that emit light but for a very short period. By its means many substances hitherto unsuspected of phosphorescence have been proved capable of retaining light for very short periods. The name is also given to a philosophical toy for showing phosphorescent substances in the dark.

Phosphorus (fos′fo-rus), a solid, non-metallic, combustible substance ranking as one of the elements; symbol P, atomic weight 31; specific gravity 1.826. It occurs chiefly in combination with oxygen, calcium, and magnesium, in volcanic and other rocks, whose disintegration constitutes very fertile soils. It exists also in the plants used by man as food, and is a

never-failing and important constituent in animal structures. It is manufactured from bones, which consist in part of phosphate of lime, or from native mineral phosphate of lime. Common phosphorus when pure is almost transparent and colorless. At common temperatures it is a soft solid, easily cut with a knife, and the cut surface has a waxy luster; at 108° it fuses, and at 550° is converted into vapor. It is exceedingly inflammable. Exposed to the air at common temperatures it undergoes slow combustion, emits a white vapor of a peculiar, alliaceous odor, appears luminous in the dark, and is gradually consumed. On this account phosphorus should always be kept under water. A very slight degree of heat is sufficient to inflame phosphorus in the open air. Gentle pressure between the fingers, friction, or a temperature not much above its point of fusion, kindles it readily. It burns rapidly even in the air, emitting a splendid white light, and causing intense heat. Its combustion is far more rapid in oxygen gas, and the light far more vivid. The product of the perfect combustion of phosphorus is phosphorus pentoxide or phosphoric anhydride (P_2O_5), a white solid which readily takes up water, passing into phosphoric acid (which see). Compounds of phosphoric anhydride with basic bodies are known as *phosphates* (which see). Phosphorus may be made to combine with most of the metals, forming compounds called *phosphides*. When dissolved in fat oils it forms a solution which is luminous in the dark. It is chiefly used in the preparation of lucifer-matches, and also in the preparation of phosphoric acid. It is of all stimulants the most powerful and diffusible, but on account of its activity highly dangerous. It can be safely administered as a medicine only in extremely minute doses and with the utmost possible caution. Phosphorus presents a good example of allotropy, in that it can be exhibited in at least one other form, known as *red* or *amorphous phosphorus*, presenting completely different properties from common phosphorus. This variety is produced by keeping common phosphorus a long time slightly below the boiling-point. It is a red, hard, brittle substance, not fusible, not poisonous, and not readily inflammable, so that it may be handled with impunity. When heated to the boiling-point it changes back to common phosphorus.

Phosphorus Acid (fos'fo-rus; H_3PO_3), an acid produced by exposing sticks of phosphorus to moist air, and in several other ways. Phosphorous acid exists usually in the form of a thick, uncrystallizable syrup, but it may also be obtained crystallized.

Photius (fō'shi-us), a patriarch of Constantinople, born of patrician parents in that city early in the 9th century. His wealth and interest raised him to the highest offices of the state, whilst he enjoyed the reputation of being the most universally learned and accomplished man of his age. He became secretary of state under the emperor Michael III, and contracted an intimacy with the minister Bardas, uncle of the emperor. On the deposition of the patriarch Ignatius, Bardas persuaded the emperor to raise Photius to the patriarchal dignity. The installation was recognized by the metropolitans of the patriarchate, but was opposed by Pope Nicholas I, whom Photius soon after excommunicated, thereby laying the foundation of the schism between the Eastern and Western churches. But the Emperor Michael having been murdered in 867 by Basil, who was raised to the throne, that prince immediately replaced Ignatius in his office, and banished Photius, who, however, resumed his dignity on the death of Ignatius in 878. On the accession of Leo, son of Basil, to the imperial throne in 886, Photius was again deposed, and banished to a monastery in Armenia, where he died in 891. Photius was an able ecclesiastical statesman, and a man of great intellect, erudition, and literary power. His chief work is the *Myriobiblion*, which may be described as an extensive review of ancient Greek literature.

Photo-engraving, a common name of many processes, in which the action of light on a sensitized surface is made to change the nature or condition of the substance of the plate or its coating, so that it may, by processes, be made to afford a printing surface corresponding to the original from which the photographic image was derived.

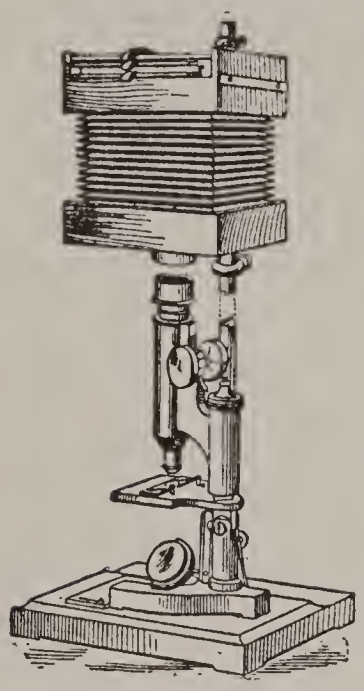
Photography (fō-tog'ra-fi; Greek, *phōs*, *phōtos*, light, and *graphō*, I write) is the art of taking representations of objects by the action of light through the lenses of the camera obscura on a previously prepared surface. It is of comparatively recent origin, though, as early as the commencement of the 19th century, Mr. Thomas Wedgewood had discovered a method of copying paintings on glass and of making profiles by the action of light upon nitrate of

silver. About 1814 M. Nicéphore Niepce, in France, discovered a method of producing, by means of the camera obscura, pictures on plates of metal coated with asphaltum, and at the same time of rendering them permanent. In 1839 Daguerre announced the discovery of the daguerreotype. (See *Daguerreotype Proeess.*) In the meantime, however, Mr. Henry Fox Talbot had discovered the process of obtaining pictures in the camera by the agency of light on paper coated with chloride and nitrate of silver, and also of fixing them when so obtained. Mr. Talbot gave the name of *ealotype* to his process (from *kalos*, fair, and *tupos* or *typos*, an impression), and subsequently introduced various improvements on it, and took out several patents, the earliest being in 1841. It has also been called after him *talbotype*, in the same manner as *daguerreotype* from Daguerre. Numerous modifications of the calotype were introduced, besides various new photographic processes, the most important being those of M. Niepce de St. Victor and Mr. Scott Archer, the former of whom introduced the use of albumen and the latter that of collodion as a substitute for paper, these substances being in either case thinly spread over a plate of glass. Mr. Archer perfected the wet collodion process, and published full working details in 1851. Collodion dry plates were introduced by Dr. Hill Norris in 1856; collodion emulsion dry plates by Messrs. Sayce and Bolton in 1864. In 1871 Dr. R. L. Maddox discovered that glass plates could be coated with an emulsion consisting of bromide of silver contained in gelatine. This gelatine dry-plate process was improved by Bennett in 1878, and came into general use about 1880. It is now almost the only process employed in ordinary photography.

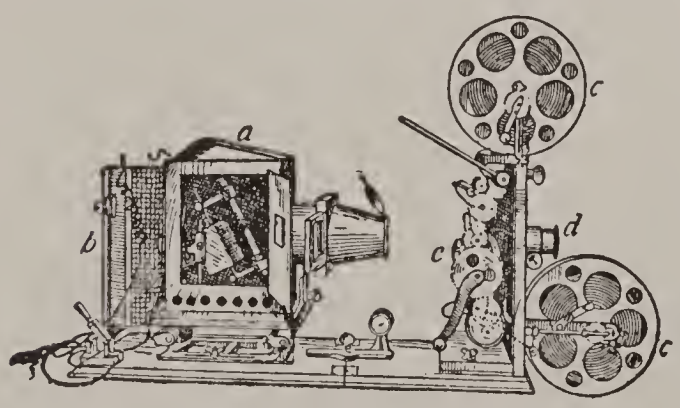
Photographs may be either *negative* or *positive*. *Negative* photographs are produced in the camera, and exhibit the lights and shades contrary to nature, that is, the lights dark and shades white. In order to obtain prints or *positives* several methods are used. In silver printing a paper sensitized by being floated on a solution of albumen mixed with common salt, and then on a solution of nitrate of silver, is placed in close contact with the negative in a printing-frame, and exposed to light until the silver compounds have become sufficiently darkened. It is afterwards toned, fixed, and washed. In the *platinotype* process the paper is sensitized by ferric oxalate and a double salt of potassium and platinum. The latter process requires no toning, and produces a permanent print.

In 1855 M. Poitevin devised a process by which pictures of great beauty and permanence were obtained. He combined carbon or any other pigment, in a fine state of division, with gelatine, starch, or gum, applied it over the surface of his paper, dried it, submitted it to the action of light under a photographic negative, and so first produced what is now usually called a carbon print. In 1864 carbon-printing was brought to a high state of perfection by Mr. Swan, of Newcastle, whose plan was to prepare a solution of gelatine and bichromate of potash (the latter being the sensitizing agent), mixed with some black pigment, and apply the mixture as a coating to a sheet of paper, and print his positives on the black cake, or *tissue* as it is called, thus produced. One of the most important discoveries in connection with photographic printing was that of Mr. Walter Woodbury. By his process the hardened tissue is brought into contact with a plate of type metal under considerable pressure. The plate takes the impression of the relief, and pictures are printed from it instead of from the raised tissue. The autotype process, invented by Mr. Johnson, is a more simple and ready method of carbon-printing than the carbon process proper, but the principles involved are the same. It is used for book illustrations and picture reproduction. Photolithography, the process of reproducing copies of a photograph from a lithographic stone, was discovered by Asser, of Amsterdam, in 1859. Various modes of multiplying photographic pictures by photolithography have been successfully tried. A common mode is to take a print on paper sensitized with gelatine and bichromate of potassium, and to ink it with a suitable oily ink. This ink adheres to the parts where the gelatine has been acted on by light and has become insoluble, but where the gelatine is still soluble the ink can be easily washed off. It is then transferred to a lithographic stone in the usual way. In *photozincography* the process consists in projecting an impression on a plate of prepared zinc by photography and then engraving it by etching with acids, so that copies can be printed from the plate. In 1887 it was announced that Mr. Mayall had discovered the secret of taking photographs in natural colors, and since then much progress has been made in this direction. While colors cannot be directly reproduced, interesting and effective indirect methods have been discovered, and the problem is practically solved. Brilliant photographs of spectra have been produced, and photography has

become a highly important agent in astronomical research, yielding much information not obtainable by eyesight. Since the introduction of the gelatine plate the art of photography has made immense advances, and its applications are endless. Hand (sometimes called *detective*) cameras in all shapes and sizes have been introduced, some of which take pictures of ¼ and ½ plate size. Many improvements have also been made in instantaneous shutters. These are now so carefully adjusted by mechanical appliances that they can be regulated to a small fraction of a second, or a prolonged exposure can be given to any part of the subject at will. These instantaneous processes have enabled scientists to analyze muscular movements and the various modes of locomotion. Remarkable results have also been attained in the application of photography to astronomy, and pictures of the most remote parts of the heavens are now common. The employment of photography in connection with the microscope has been of great assistance in chemistry and biology. Its application in the various processes of book-illustration has also been very successful. Photography by means of artificial light has also been brought to great perfection.



Vertical Photomicrographic Camera.



Moving Picture Machine.

a, arc-lamp; *b*, rheostat; *c*, *c*, film-holders; *d*, objective; *e*, mechanism for moving film and operating shutter.

Photography is now a scientific and fashionable pastime, and men and women amateurs in many cases excel professionals. Photographic societies exist in most large towns, the object being the advancement of photography through the experiments and research of members, who include the leading amateur photographers. A rapid succession of photographs of an event is utilized in the popular moving pictures. When shown rapidly they yield virtually an uninterrupted reproduction.

Photogravure (fō′tu-gra-vūr), a process of engraving in which by the aid of photography subjects are reproduced as plates suited for printing in a copper-plate press. The process known as Heliogravure (which see) is essentially the same.

Photoheliograph (fō-tō-hēl′i-u-graf), an instrument for observing transits of Venus and other solar phenomena, consisting of a telescope mounted for photography on an equatorial stand and moved by suitable clockwork.

Photolithography. See *Photography.*

Photometer (fō-tom′e-tėr), an instrument intended to indicate relative quantities of light, as in a cloudy or bright day, or to enable two light-giving bodies to be compared. Photometers depend on one or other of the two principles, that the eye can distinguish whether two adjacent surfaces are equally illuminated, and whether two contiguous shadows have the same depth. Benson's photometer is based on the former principle, Rumford's on the latter. The common unit for comparison is the light emitted by a sperm-candle burning 120 grains of spermaceti per hour, other lights being said to have the intensity of so many candles. Improved forms of photometers for more easily obtaining the illuminating power produced by coal-gas and the electric light have recently been introduced.

Photophone (fō′tu-fōn), an instrument invented in 1880 by Alexander Graham Bell, which resembles the telephone, except that it transmits sounds by means of a beam of light instead of the connecting wire of the telephone. The success of the instrument depends upon a peculiar property of the rare metal selenium, that, namely, of offering more or less opposition to the passage of electricity according as it is acted upon or not by light. In its simplest form the apparatus consists at the receiving end of a plane mirror of some flexible material (such as silvered mica)

upon which a beam of light is concentrated, and the voice of a speaker directed against the back of this mirror throws the beam of light reflected from its surface into undulations which are received on a parabolic reflector at the other end, and are centered on a sensitive selenium cell in connection with a telephone, which reproduces in articulate speech the undulations set up in the beam of light, by the voice of the speaker.

Photosphere (fō′tu-sfēr), the luminous envelope, supposed to consist of incandescent matter, surrounding the sun. See *Sun.*

Photo-telegraphy (fō-tō-tē-leg′ra-fi). The electric transmission of facsimiles of photographs, drawings, etc.; facsimile telegraphy.

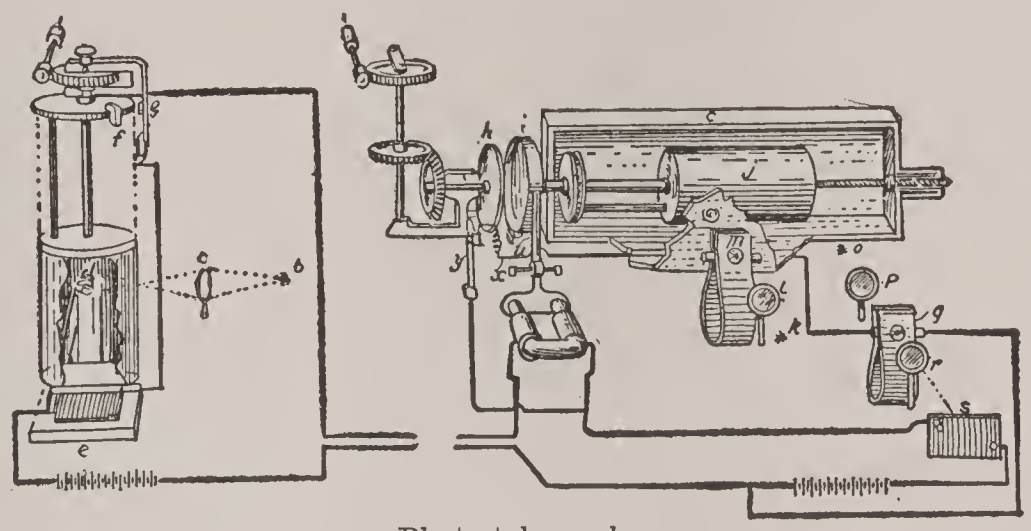


Photo-telegraphy.

Korn's apparatus for transmitting pictures by telegraph, using a selenium cell.

Photozincography. See *Photography.*

Phragmites (frag-mī′tēz), a genus of large grasses widely spread, and usually known as reeds. *P. commūnis,* the common reed, grows from six to ten feet high, on the borders of lakes and rivers.

Phrenology (fre-nol′ō-ji; Greek, *phrēn,* mind, *logos,* discourse), the term applied to the psychological theories of Gall and Spurzheim, founded upon (1) the discovery that the brain, as the organ of the mind, is not so much a single organ as a complex congeries of organs; and (2) observations as to the existence of a certain correspondence between the aptitudes of the individual and the configuration of his skull. Phrenology may therefore be regarded as a development, partly scientific and partly empirical, of the general idea that a correspondence exists between the physical structure and the psychical and mental traits of every individual man or animal. It was long ago observed by physiologists that in animals a certain character and intelligence seemed to accompany a certain formation and size of skull. Lavater, in his system of physiognomy, went further than this, and gave to particular shapes of the head certain powers and passions: the conical head he terms *religious;* the narrow, retreating front, *weak-minded;* the broad neck, *salacious,* etc. But it was reserved to Drs. Gall and Spurzheim to expand this germ of doctrine into a minute system, and to map out the whole cranium into small sections, each section being the dwelling-place of a certain faculty, propensity, or sentiment. Gall first started this so-called science; but to Spurzheim it is mainly indebted for its systematic arrangement, and to Dr. Combe, of Edinburgh, for its advocacy. Gall commenced giving private lectures on the subject in 1796. In 1800 he was joined by Spurzheim, who continued his colleague till 1813, both conducting their researches in common, and traveling together from place to place. At Paris their theories were investigated by a commission of the Institute of France, the result being an unfavorable report drawn up by the celebrated Cuvier. In 1814 Spurzheim came to Britain, where his lectures gained many disciples, among others George Combe, of Edinburgh, one of the best expounders and defenders of phrenology which it can boast. Spurzheim eventually went to America, where he died in 1832.

So far as phrenology was scientific, it undoubtedly was one cause which led to the minute anatomical investigations to which the brain has latterly been subjected; and Gall and Spurzheim have high claims to be regarded as anatomical discoverers and pioneers. Previous to their dissections the brain had generally

been regarded as a single organ rather than a complex congeries of organs. Gall's view of the physiology of the brain was, that the convolutions are distinct nervous centers, each having its own special activity; that the frontal lobes are occupied by the perceptive group of centers; the superior lobes by the moral and æsthetic groups; the inferior lobes by the group mainly concerned in the nutrition and adaptation of the animal to external conditions; and the posterior lobes to the social instincts. To a considerable extent these views have been pronounced to be well founded by later specialists, and thus the leading positions of Gall and Spurzheim have taken a place in scientific psychology as represented by Bain, Carpenter, Ferrier, Wagner, Huschke, and others.

The empirical side of phrenology, sometimes called *craniology*, rests upon the assumption that the relative development of the centers of the brain can be accurately determined by an external examination of the protuberances and depressions of the skull. Craniology is admitted to have a certain degree of foundation in the general truths of physiology, but it cannot pretend to scientific exactness or well-reasoned theory, and in the hands of those who know it best it usually makes no such claim. Its conclusions, like its data, are uncertain and general, because in attempting to delineate a man mentally, morally, and psychically, there are many things other than the external shape of the skull which have to be taken into account, and also many things of essential importance of which it is impossible to take account. For example, the cranium may be small, and yet, owing to the depth of the furrows, the cortex or thinking membrane of the brain may be large; on the other hand, owing to the superficial nature of the furrows, a large cranium may co-exist with a very limited development of cortex. Such a fact as this, it is obvious, is unverifiable in any special instance, except a *post mortem* examination be made.

Phrygia (frij'i-à), in ancient geography a region comprising the western central part of Asia Minor, containing the cities Apamea, Laodicea, and Colossæ. The inhabitants were early civilized, and paid much attention to grazing and tillage. The early history of Phrygia is mythological. Several of its kings are mentioned of the names of Gordius and Midas. On the death of Adrastus (B.C. 560) the royal family of Phrygia became extinct, and the kingdom became a province of Lydia. It afterwards formed a part of the Persian, and still later of the Roman Empire.

Phryne (frī'nē), a famous courtesan of Greece, mistress of Praxiteles, who employed her as a model for his statues of Venus. She offered to rebuild Thebes, if the inscription 'Alexander destroyed this city, and the courtesan Phryne restored it,' be put upon the walls; but the offer was rejected.

Phthiotis (thī-ō'tis), a district of ancient Greece in the south of Thessaly, now forming with Phocis a nomarchy of Greece. Pop. 128,440.

Phthisis (thī'sis). See *Consumption.*

Phycology (fi-kol'u-ji), that department of botany which treats of the algæ or seaweeds.

Phylactery (fi-lak'tėr-i), among the Jews a strip of parchment inscribed with certain texts from the Old Testament, and enclosed within a small leathern case, which was fastened with straps on the forehead just above and between the eyes, and on the left arm near the region of the heart. The four passages inscribed upon the phylactery were Ex., xiii, 1–10, 11–16; Deut., vi, 4–9; xi, 18–21. The custom was founded on a literal interpretation of Ex., xiii, 16; Deut., vi, 8; xi, 18. Phylacteries are the 'prayer-thongs' of the modern Jews. In their origin they were regarded as amulets, which protected the wearer from the power of demons, and hence their name, which is from the Greek *phulassein*, to guard.

Phyllium. See *Leaf-insects.*

Phyllodium (fi-lō'di-um), in botany, the name given to a leaf-stalk when it becomes developed into a flattened expansion like a leaf, as in some Australian species of acacia and certain other plants.

Phyllopoda (fil-op'u-dà; 'leaf-footed'), an order of Crustacea possessing numerous feet, numbering eight pairs at least, the first pair being natatory in character. The feet are of foliaceous or leaf-like structure, and are provided with branchial appendages, adapted to subserve the breathing or respiratory function. The carapace, or shelly covering protecting the head and chest, may be well developed, or the body may be destitute of a covering. In their development the Phyllopoda pass through a metamorphosis; and in their earliest state the embryos appear as in the 'nauplius' form (see *Nauplius*). All the Phyllopoda are of small size. The order is represented by

the familiar 'fairy shrimps' (*Chirocephălus*), met with in fresh-water ponds, and the curious 'brine shrimps' (*Artemia*), found in the brine-pans of salt-works, and in the salt lakes of both the Old and New Worlds. The Phyllopoda are of high interest to the palæontologist, on account of the affinities they present to the extinct trilobites (see *Trilobite*). The Phyllopoda themselves are represented as fossils in the Palæozoic rocks.

Phyllostomidæ (fil-os-tom'i-dē), the vampire bats, a family of insectivorous bats. See *Vampire Bat.*

Phylloxera (fil-ok-sē'rà), a genus of plant-lice, family Aphidæ, order Hemiptera. The type of the genus is *Phylloxera quercus*, a species which lives upon oak-trees; but the *Phylloxera vastatrix*, or grape Phylloxera, a species which injuriously affects the vine, has attracted so much attention of late years that it has come to be known as *the* Phylloxera. It presents itself in two types, the one gall-inhabiting (*gallicola*), and the other root-inhabiting (*radicola*). Its proper home is North America, where it was known early in the history of grape culture, and where it doubtless existed on wild vines from time immemorial. It was discovered in England in 1863, and about the same time it made its appearance in France, where it committed great ravages, inflicting immense loss upon the owners of vineyards. Widening its area not only by natural means, but also by commerce in vines and cuttings, it was carried from infected to non-infected districts, and spread to Spain, Portugal, Switzerland, Austria, Prussia, and to all the grape-growing countries of Europe. Only where the soil was of a sandy nature did the vineyards escape. In 1885 its presence was discovered in Australia, at the Cape of Good Hope, and in Algeria; and, generally speaking, it has now obtained a foothold, at least in restricted localities, in every country where the grape-vine is cultivated. Vines attacked by Phylloxera generally show external signs the second year of attack in a sickly yellowish appearance of the foliage and in stunted growth, and the third year they frequently perish, all the finer roots having decayed and wasted away. Many remedies have been proposed, but none is universally practicable or satisfactory.

Phylogeny (fi-loj'e-ni), a term applied to the evolution or genealogical history of a race or tribe. It is used in contrast to ontogeny, which signifies the development or life-history of an individual.

Physalia (fi-sā'li-a), a genus of marine animals of the class Hydrozoa, of the subclass Siphonophora. The *P. Atlantica* is known by the name of the *Portuguesc man-of-war.* These hydrozoa are characterized by the presence of one or more large air-sacs, by which they float on the surface of the ocean. Numerous tentacles depend from the under side, one class short and the other long. The shorter are the nutritive individuals of the colony, the longer, which in a Physalia 5 or 6 inches long are capable of being extended to 12 or 18 feet, possess a remarkable stinging power, and are probably used to stun their prey.

Physalia Atlantica (Portuguese man-of-war).

Physeter (fī'se-tir). See *Sperm-whale.*

Physical Geography embraces the branch of geography which treats of the surface of the earth, or of any part of it as regards its natural features and conformation, the changes that are constantly taking place and that have formerly taken place so as to produce the features now existing; it points out the natural divisions of the earth into land and water, continents, islands, rivers, seas, oceans, etc.; treating of the external configuration of mountains, valleys, coasts, etc.; and of the relation and peculiarities of different portions of the water area, including currents, wave-action, depth of the sea, salt and fresh water lakes, the drainage of countries, etc. The atmosphere in its larger features is also considered, including the questions of climate, winds, storms, rainfall, and meteorology generally. Finally it takes up various questions connected with the organic life of the globe, more especially the distribution of animals and plants, and their relation to their environment; tracing the influence of climate, soil, natural barriers or channels of communication, etc., upon the growth and spread of plants and animals, including in the latter the various races of man. The field of physical geography is thus by no means easy to confine within strict limits, as it is so closely connected at various points with geology, mineralogy, botany and zoölogy, chemistry, ethnology, etc. The term Physical

geography is often replaced by Physiography (which see).

Physicians, ROYAL COLLEGE OF (LONDON), a body which owes its origin to the exertions of Thomas Linacre, one of the physicians of Henry VIII, who, through the influence of Cardinal Wolsey, obtained in 1518 from that monarch letters patent incorporating himself with certain other physicians named, and all other men of the same faculty in London, as one body. Various privileges were accorded to them, the chief of which was that of prohibiting any one from practicing as a physician in London, or within a circuit of 7 miles round it, unless he had first obtained a license from this corporation. A charter granted four years later confirmed the privileges of the body, except that graduates of Oxford and Cambridge were permitted to practice within the jurisdiction of the college without previously being examined by it. Various charters have been granted to the body subsequently, but since the passing of the Medical Act of 1858, the license of the college is not necessary to those practicing in London or within 7 miles round.

Physick (fis'ik), PHILIP SING, surgeon, was born at Philadelphia, Pennsylvania, in 1768. He was graduated at the University of Pennsylvania in 1785 and in 1791 was licensed by the Royal College of Surgeons in London. In 1805 he became Professor of Surgery in the University of Pennsylvania; in 1825 was elected member of the French Academy of Medicine, and in 1836 honorary fellow of the Royal Medical and Chirurgical Society of London. One of his most brilliant operations was that of enterotomy on Chief-Justice Marshall, which resulted in the removal of over 1000 calculi and a perfect cure. He introduced numerous valuable instruments and improved modifications of others, and applied novel methods of treatment. His skill brought him the title of the 'father of American surgery.' He died in 1837.

Physic-nut, the seed of the *Curcas purgans* (*Jatrŏpha purgans*), or the plant itself, a shrub belonging to the natural order Euphorbiaceæ, a native of intertropical countries, principally the East and West Indies. The seeds have acquired the name in virtue of their strong emetic and purgative properties, due to a fixed oil which resides principally in the embryo. This oil is expressed and used in medicine under the name of *Jatropha-oil*, for the same purposes as croton-oil, although it is less powerful. The name of French or Spanish physic-nuts is given to the seeds of another member of the same genus, the *Curcas multifidus*, a native of the same regions. The oil expressed from it is called Oil of Pinhoen, and is similar in its properties to Jatropha-oil.

Physics (from Greek, *physis*, nature), or NATURAL PHILOSOPHY, is the study of the phenomena of the material world, or of the laws and properties of matter; more restrictedly it treats of the properties of bodies as bodies, and of the phenomena produced by the action of the various forces on matter in the mass. It thus has as its chief branches the subjects dynamics, hydrostatics, heat, light, sound, electricity, and magnetism. (See the different articles.)

Physiognomy (fiz-i-og'nu-mi), the doctrine which teaches the means of judging of character from the countenance. Aristotle is the first who is known to have made any attempts in physiognomy. He observed that each animal has a special predominant instinct; as the fox cunning, the wolf ferocity, and so forth, and he thence concluded that men whose features resemble those of certain animals will have similar qualities to those animals. Baptista della Porta, in his work *De Humana Physiognomia* (1586), revived this theory and carried it out further. The theory was adopted and illustrated by the French painter Lebrun, in the next century, and by Tischbein, a German painter of the 18th century. The physiologist Camper sought new data in a comparison of the heads of different types of the human species, and in attempting to deduce the degree of intelligence belonging to each type from the size of the facial angle. Lavater was the first to develop an elaborate system of physiognomy, the scope of which he enlarged so as to include all the relations between the physical and moral nature of man. (See *Lavater*.) It is a subject of great interest, but one must be on his guard against a general application of the rules which experience seems to have furnished him.

Physiography (fiz-i-og'ra-fi), a term often used as equivalent to physical geography (which see); but otherwise used to embrace the aggregate of information necessary to be acquired as a preliminary to the thorough study of physical geography, or as an introduction to the study of nature and its forces.

Physiologus, same as Bestiary. See *Bestiaires*.

Physiology (fiz-i-ol'ō-ji), in medical and biological science, the department of inquiry which

investigates the *functions* of living beings. In its wide sense the living functions of both animals and plants come within the scope of physiology, this division of the subject being comprehended under the terms *comparative physiology* and *animal* and *vegetable physiology*. When more specially applied to the investigation of the functions in man the appellation *human physiology* is applied to the science. The importance of physiological inquiry in connection with the observation of diseased conditions cannot be overrated. The knowledge of healthy functions is absolutely necessary for the perfect understanding of diseased conditions; and the science of *pathology*, dealing with the causes and progress of diseases, may in this way be said to arise from, and to depend upon, physiological inquiry. Physiology in itself thus forms a link connecting together the various branches of natural history or biology and those sciences which are more specially included within a medical curriculum. The history of scientific physiology may be said to begin with Aristotle (384–322 B.C.), who attained no mean knowledge of the subject. The Alexandrian school, flourishing about 280 B.C. under the Ptolemies, and represented by Erasistratus, Herophilus, and others, obtained greater opportunities for the acquirement of physiological knowledge through the investigation of the bodies of criminals who had been executed. Erasistratus thus threw much light on the nervous system and its physiology; whilst Herophilus made important observations on the pulse, and in addition discovered the lacteal or absorbent vessels and the depression in the back of the skull formed by the blood sinuses of the brain and called the torcular Herophili, or 'winepress of Herophilus.'

After this there was a period of decline, but Galen, living in the 2d century after Christ, again raised the science to a respectable position, and effected a vast advance and improvement in physiological knowledge. The systems which succeeded Galen and his times consisted, until about 1543, of absurd speculations and theories, conducive in no respect to the advance of true knowledge. In 1543 Vesalius paved the way towards the more scientific epochs of modern times by his investigations into the anatomy and structure of the human frame. In 1619 Harvey, the 'father of modern physiology,' discovered the circulation of the blood. Since this time the history of physiology has gone hand in hand with the general history of anatomy (which see). One noteworthy peculiarity of modern physiological research consists in the introduction and extensive use of the experimental mode of investigation in physiology; and of elaborate and delicate instruments and apparatus, such as the sphygmograph, or pulse-recorder; the ophthalmoscope; the laryngoscope; and the microscope. The different departments of physiology may be enumerated as comprehending the investigation of the three great functions which every living being performs, namely (1) *nutrition*, including all that pertains to digestion, the circulation, and respiration; (2) *innervation*, comprising the functions performed by the nervous system; (3) *reproduction*, which ensures the continuation of the species and includes also the phenomena of *development*. See the articles *Digestion*, *Respiration*, *Skin*, *Eye*, *Ear*, *Larynx*, *Tongue*, etc.

Physostigma. See *Calabar Bean.*

Physostomi (fī-sos'tu-mi), a name used as equivalent to Malacopteri, a suborder of Teleostean fishes. See *Ichthyology.*

Phytelephas (fī-tel'e-fas). See *Ivory-palm.*

Phytoglyphy (fī-tog'li-fi; Gr. *phyton*, a plant, *glyphō*, to engrave), the art of printing from nature. See *Nature-printing.*

Phytolacca (fī-to-lak'ka), a genus of tropical or subtropical herbaceous plants, type of the nat. order Phytolaccaceæ. One species is the American pokeweed (which see).

Phytology (fī-tol'ō-ji), a word sometimes used for *botany.*

Phytozoa (fī-to-zō'a), a name synonymous with *Zoophytes.*

Piacenza (pē-à-chen'tsà, anc. *Placentia*), a town of North Italy, capital of a province of same name, nearly equidistant from Parma and Milan, at the confluence of the Trebbia with the Po. Being a place of strategic importance, it has long been fortified, and is still surrounded by walls with bastions and fosse, outside which are a series of detached forts. The principal edifices are the cathedral, in the Lombard-Romanesque style (mostly built between 1122 and 1233) and other churches; the town-house, of the 13th century, one of the finest structures of its kind; and the Palazzo Farnese (now used as barracks). Piacenza is an important railway center. The manufactures consist of cotton goods, woolens, stockings, hats, leather, etc., and there are also several silk-spinning and paper-mills. Piacenza was originally a Roman colony and was founded in 219 B.C. Between 997 and 1035 it was governed by its bishops. In 1447 it was

captured and sacked by Francesco Sforza; and in 1545 it was united with Parma to form an hereditary duchy for Pierluigi Farnese, son of Pope Paul III. Pop. 36,064.—The province belongs to the basin of the Po, and is generally fertile; area, 965 sq. miles; pop. 245,126.

Pia Mater (pī'a mā'tėr), one of the membranes investing the brain. See *Brain.*

Piana dei Greci (pē-ä'nå de-i-grā'-chē), a town in Sicily, in the province and 10 miles s. s. w. of the city of Palermo. Pop. 8285.

Piano (pi-an'ō; Italian), soft, low; used in music in contradistinction to *forte. Pianissimo*, the superlative of *piano.*

Pianoforte (pi-an'u-for-te), or PIANO, a musical stringed instrument, the strings of which are extended over bridges rising on the sounding-board, and are made to vibrate by means of small felted *hammers*, which are put in motion by *keys*, and where a continued sound is not intended to be produced have their sound deadened immediately after the touch of the keys by means of leathern *dampers.* Its name is compounded of two Italian words signifying soft and strong, and it was so called in contradistinction to the harpsichord, the instrument which it superseded, and which did not permit of the strength of the notes being increased and diminished at will. The mechanism by which the movement of the keys is conveyed to the strings is called the *action*, and there is no part of the pianoforte in which the variations are more numerous. There are usually three strings in the pianoforte for each note in the higher and middle octaves, two in the lower, and one in the lowest notes. The strings are of steel wire. The lowest notes have their strings wound round with a double coil of brass wire, and those next above with a single coil. Pianofortes are either in the form of the grand piano, in which the strings lie in the direction of the keys, or they have the strings stretched vertically perpendicular to the keys, which is now the most common form, and constitutes the upright piano. Recently a variety called the upright grand has also been introduced. Grand pianos are used as concert instruments, and have the greatest compass and strength. The common compass of the piano at present is six and seven-eighths or seven octaves. The invention of the pianoforte can scarcely be ascribed to any one man in particular. The first satisfactory hammer-action appears to have been invented by an Italian of Padua, named Bartolommeo Cristofali, about 1711. Among the principal improvers of the pianoforte are Sebastian Erard, the founder of the celebrated firm still in existence; Roller et Blanchet, the French firm which introduced the upright piano; and others of later date.

Piarists (pī'a-ristz), a Roman Catholic religious order, devoted to the gratuitous instruction of youth, instituted at Rome, about the end of the 16th century. The Piarists resemble the Jesuits in their costume, and in their devotion to the service of the church and to education; but they do not meddle in political matters. Italy, Austria, Hungary, and Spain have been the chief seats of their activity.

Piassaba (pi-as-sa'ba), or PIASSA'VA, a strong vegetable fiber imported from Brazil, and largely used for making brooms. It is chiefly obtained from palms such as *Attalēa funifĕra* and *Leopoldinia piassāba.* The fiber proceeds from the decaying leaves, the petioles of which separate at the base into long, coarse, pendulous fringes. It was first utilized in England, and the consumption is now large. Other European countries also consume considerable quantities.

Piastre (pi-ås'tr), a name first applied to a Spanish coin, which, about the middle of the 16th century, obtained almost universal currency. The Spanish piastre had in later years the value of about 96 cents. The Turkish piastre, originally worth about 84 cents, has now declined in value to about 4 cents in Turkey and 5 cents in Egypt.

Piatra (pyå'trå), a town in Roumania, on the Bistritsa, 53 miles southwest of Jassy. It carries on a large trade in grain and timber. Pop. 17,391.

Piatt (pī'at), JOHN JAMES, poet, born at Milton, Indiana, in 1835. He engaged in journalism, became clerk of the United States Treasury and of the House of Representatives, and was consul at Cork, Ireland, 1882–94. He published *Poems by Two Friends* (with W. D. Howells), *Poems of Heart and Home*, and other volumes of verse.—SARAH M. B. PIATT, his wife, born in Kentucky in 1836, was also a poet of merit, and published *A Woman's Poems*, *A Voyage to the Fortunate Isles*, etc.

Piauhi (pē-ou-ē'), or PIAUHY, a province of Brazil, bounded by the Atlantic and the provinces of Ceará, Pernambuco, Bahia, and Maranhão, from which latter it is separated by the Parnahyba; area, 116,523 square miles. Its

coast-line is not above 10 miles in length. The soil, generally composed of alluvium, is of great natural fertility; but there is very little agriculture. The rearing of cattle, esteemed the best in Brazil, constitutes the principal source of wealth. Capital, Therezina; port, Parnahyba. Pop. 334,328.

Piazza (pi-az′a; Italian), in architecture, is a square or other open space surrounded by buildings. The term is frequently, but improperly, used to signify an arcaded or colonnaded walk.

Piazza-Armeri′na, a town of Italy, in Sicily, province of Caltanissetta, and 18 miles E. S. E. of the town of Caltanissetta, said to have been founded by Greeks from Platæa, Pop. 24,379.

Piazzi, GIUSEPPE, an Italian astronomer, born in 1746; died in 1826. In 1780 he became professor of mathematics at Palermo, where he promoted the establishment of an observatory and compiled his *Catalogue of the Stars.* January 1, 1801, he discovered the planet or asteroid Ceres, which opened the way for the discovery of so many others.

Pibroch (pē′broh), a wild, irregular species of music peculiar to the Highlands of Scotland. It is performed on a bagpipe, and adapted to excite or assuage passion, and particularly to arouse a martial spirit among troops going to battle. The pibroch produces by imitative sounds the different phases of a battle — the march, the conflict, the flight, the pursuit, and the lament for the fallen.

Pica (pī′ka), the name of a standard size of type. See *Printing.*

Pica, the generic name of the magpies.

Pica, a depraved form of appetite. See *Appetite.*

Picard (pi-kär), JEAN, a French astronomer, born in 1620; died in 1682. In 1655 he became Gassendi's successor in the chair of astronomy in the Royal College of France. The measurement of an arc of the meridian is the work by which Picard is now chiefly known — a measurement historically important in the science of astronomy, as it furnished Newton with the means of verifying his theory of gravitation.

Picard, LOUIS BENOÊT, a French writer of comedies, born in 1769; died in 1828. Before he was quite eighteen he became an actor, and almost as early he began to write for the stage, his first play being *Le Badinage Dangereux* (1789). On account of his skilful delineation of character, he was called by the French *Le petit Molière.* He was the author of more than seventy larger and smaller pieces, besides several romances.

Picardy (pik′ar-di), formerly a province of France, in the northern part of the kingdom, lying between the British Channel, Normandy, and Artois, now divided among the departments of Pas-de-Calais, Somme, Aisne, Oise, and Nord. The capital was Amiens.

Piccini (pit-chē′nē), NICCOLO, an Italian musical composer, born in 1728; died in 1800. He composed comic and serious operas, chiefly for the stages of Rome and Naples, with such success that for many years he was without a rival in Italy. In 1776 he accepted an invitation, on very favorable terms, from the French court, and went to Paris, where he engaged in the famous musical contest with Gluck. (See *Gluck.*) In his later years he fell into misfortunes. He wrote over 150 operas, besides numerous oratorios and cantatas.

Piccolo (pik′u-lō; Italian, *little*), a small flute having the same compass as the ordinary flute, but pitched an octave higher.

Piccolomini (pik-u-lom′i-ni), a distinguished Siennese family, still flourishing in Italy in two branches. The two most celebrated members are: — 1. ÆNEAS SYLVIUS BARTHOLOMÆUS, afterwards Pope Pius II. (See *Pope Pius II.*) — 2. OCTAVIO, a grand-nephew of the first, born in 1599; died in Vienna in 1656. He served in the armies of the German emperor, and became one of the distinguished generals in the Thirty Years' war. He was a favorite of Wallenstein, who entrusted him with a knowledge of his projects, when he purposed to attack the emperor. In spite of this he made himself the chief instrument of Wallenstein's overthrow, and after the latter's assassination (1634) was rewarded with a portion of his estates. He is one of the principal characters in Schiller's drama of *Wallenstein,* to the second part of which he gives the title. His son Max, who appears in the same play, is an invention of the poet's.

Pice (pīs), a small East Indian coin, value about $\frac{1}{4}$ cent.

Pichegru (pēsh-grü), CHARLES, a French general, born at Arbois, department of Jura, in 1761. He was for some time a tutor at the College of Brienne, but soon exchanged this profession for that of a soldier. After the outbreak of the French Revolution he rose rapidly; was commander-in-chief of the army of the Rhine in 1793, and of the army of the north in 1794; subjugated Holland, and entered Amsterdam in January, 1795. Pichegru

was now at the height of his fame, and was honored by the convention with the title of savior of his country; but, disgusted with the anarchical state of affairs then prevailing in the capital, he entered into negotiations with the Bourbons, and became the soul of the party hostile to the Revolution. Having been proscribed in consequence of the events of the 18th Fructidor (September 4, 1797), he was transported to Cayenne, but the year following escaped to England, where he entered into a conspiracy with George Cadoudal to assassinate Napoleon. Having gone to Paris for this purpose, he was captured by the police, and committed to the Temple prison, where he was found strangled on the 6th of April, 1804.

Pichincha (pē-chēn′chȧ), a volcano of Ecuador, in the Western Cordillera, northwest of Quito; height, 15,560 feet. It gives name to a province of Ecuador; capital, Quito.

Pichurim Beans. See *Pitchurim.*

Picidæ (pi′si-dē), the woodpecker family, so named from the chief genus *Picus.* See *Woodpecker.*

Pickerel (pik′ėr-el), the young of the fish known as the pike. In the United States the name is given to some of the smaller kinds of pike.

Pickering (pik′ėr-ing), a market town of England, in North Riding of Yorkshire, 32 miles northeast of York. It is a town of great antiquity. Its castle was the prison of Richard II in 1399. Pop. 3674.

Pickering, Timothy, statesman, born at Salem, Massachusetts, in 1745; died in 1829. He took part in the battle of Lexington, served in the Continental army as adjutant-general and as quartermaster of the army, and after the war united with Patrick Henry and Alexander Hamilton in opposing the measure that drove the Tories into exile. He negotiated a treaty with the Iroquois Indians in 1791, was appointed Postmaster-general in Washington's cabinet and later was Secretary of State, serving under Washington and Adams. He was elected to the Senate in 1804, and from that time continued actively in politics.— John Pickering, his son (1777–1845), philologist, held many important positions, was president of the American Academy of Arts and Sciences, and a number of other learned societies, and published many pamphlets on philological and other subjects.— Charles Pickering, his grandson (1805–78), physician and ethnologist, wrote *The Races of Men and their Geographical Distribution, Chronological History of Plants,* etc.— Edward Charles Pickering, his great-grandson, born at Boston in 1846, was graduated at Harvard in 1865, became professor of astronomy and geodesy at Harvard, and was director of its observatory after 1876. He made the study of the light and spectra of stars special features of his work and established an auxiliary station at Arequipa, Peru, for the observation of southern stars. He is a member of many learned societies, and author of *Elements of Physical Manipulation* and many volumes of Harvard Observatory annals.— William Harry Pickering, brother of the preceding, born at Boston in 1858, also became an astronomer, and was appointed assistant professor of the Harvard Observatory. He conducted several expeditions to observe several solar eclipses, and had the honor of discovering two new satellites of Saturn, Phœbe, the ninth, and Themis, the tenth. He established astronomical stations in Arizona and Jamaica, and has been an expert in mountain climbing, ascending more than 100 peaks. He is the author of a number of astronomical and other works.

Pickles (pik′elz), vegetables and certain fruits first steeped in strong brine, and then preserved in close vessels. Wood vinegar is often used, but malt or wine vinegar produces the best pickles. Owing to the corroding effects of brine and vinegar, the use of metallic vessels should be avoided in making pickles. To give a green color to pickles verdigris or other poisonous compounds of copper are sometimes employed by manufacturers.

Pickett, George Edward, soldier, born at Richmond, Virginia, in 1825; died in 1875. He graduated at West Point in 1846, served in the Mexican war, and in 1861 joined the Confederate army as brigadier-general, being made major-general in 1862. He took a prominent part in the main battles in Virginia, and led his division in the famous 'Pickett's charge' at Gettysburg.

Pico (pē′kō), one of the Azores, consisting of a single volcanic mountain, which terminates in a peak (El Pico) 7613 feet high, that emits smoke and lava. It is fertile and well wooded, and produces an excellent wine, of which 25,000 pipes are exported annually. Area, 254 sq. miles; pop. about 130,000.

Pico della Mirandola. See *Mirandola.*

Picotee′. See *Carnation.*

Picquet. See *Piquet.*

Picric Acid. See *Carbazotic Acid.*

Picton (pik'tun), Sir Thomas, a British general, born in Pembrokeshire in 1758; entered the army in 1771, and, after serving in the West Indies, rose to the rank of colonel, and became governor of Trinidad in 1797. His next service was the capture of Flushing, of which he was appointed governor in 1809. He afterwards distinguished himself in the Peninsular war at Badajoz, Vittoria, Ciudad Rodrigo, etc. He was killed at Waterloo, 1815.

Picton, a port of entry and capital of Prince Edward's county, Ontario, Canada, 40 miles s. s. w. of Kingston. It has canning and packing industries. Pop. 3698.

Pictou, a commercial town and seaport in the northern part of Nova Scotia, on a safe and commodious harbor. Bituminous coal is mined and largely exported, and a beautiful sandstone is quarried. Pop. 3235.

Picts (piktz), the name given to the ancient Caledonians, who inhabited North Britain till the beginning of the sixth century, usually regarded as a Celtic race, though some consider them to have been not even Aryans, but Turanians. See *Scotland.*

Picts' Houses. See *Earth Houses.*

Picul (pik'ul), in China, a weight of 133⅓ lbs. It is divided into 100 catties or 1600 taels.

Picus (pī'kus), an old sylvan deity in Italy, who was represented with the head of a woodpecker (Latin, *picus*), and presided over divination. This is also the scientific name of a genus of woodpeckers.

Piddock. See *Pholas.*

Piedecuesta (pi-ā-de-kụ-es'tȧ), a town of the republic of Colombia, on the Rio de Oro, with a university. In a coffee, sugar, and tobacco region. Pop. about 12,000.

Piedmont (pēd'mont; Italian, *Piemonte*), a department or territorial division of Italy, between Switzerland, Lombardy, Liguria, and France; area, 11,340 square miles; pop. 3,407,493. It forms the upper valley of the river Po, and derives its name, signifying 'foot of the mountain,' from its situation at the base of the loftiest ranges of the Alps, by which it is enclosed on all sides except towards the Lombard plain. It forms one of the most beautiful and fertile portions of Europe, commencing on the north, south, and west in majestic mountains, and thence descending in magnificent terraces and finely undulating slopes to the rich plains of the Po, to the basin of which it all belongs. It is divided into four provinces — Turin, Alessandria, Cuneo, and Novara. The chief town in Turin. See *Sardinia* (*Kingdom of*), *Savoy* (*House of*), and *Italy.*

Pier (pēr; Fr. *pierre*, a stone), in architecture, is the name applied to a mass of masonry between openings in a wall, such as doors, windows, etc. The solid support from which an arch springs or which sustains a tower is also called a pier. The term is also applied to a mole or jetty carried out into the sea, intended to serve as an embankment to protect vessels from the open sea, and to form a harbor.

Pierce (pērs), Franklin, fourteenth President of the United States, was born at Hillsborough, New Hampshire, in 1804; died in 1869. He graduated at Bowdoin College, studied law, and began practice in 1827. He was elected to Congress by the Democratic party in 1833 and served in the House till 1837, when he was elected as a member of the Senate. He resigned in 1842, and in 1846–47 served in the Mexican war as a brigadier-general. He was nominated for the Presidency in 1852 and was elected by a very large majority of electoral votes. His influence was used in favor of the proslavery party, and in 1863 he spoke against the coercion of the seceded states.

Pierian (pī-ē'ri-an), an epithet given to the Pierides or Muses, from the district of Pieria in Thessaly, which was sacred to them.

Pierre, Bernardin de Saint. See *Saint-Pierre.*

Pierre (pi-ār), St., a small island near the southern coast of Newfoundland, forming with the adjacent island of Miquelon a colony of France. The inhabitants subsist entirely by the cod-fisheries and the industries connected with them. The Islands of St. Pierre and Miquelon were first acquired by the French in 1763; and were finally confirmed to them at the general Peace of 1814.

Pierre, a city, capital of South Dakota and county seat of Hughes Co., is situated on the Missouri River, nearly opposite Fort Pierre. It is the seat of a government industrial school for Indians and is the leading live-stock center of the state. It is an active business point for central Dakota and the Black Hills region. Pop. 3656.

Pierre (pi-ār), St., a town in the West Indies, capital of the Island of Martinique, on the northwest

coast. It had fine churches, a botanical garden, and was well fortified, but was totally destroyed, with its 30,000 inhabitants, by an eruption of Mt. Pelee, May 8, 1902.

Pierrefonds (pi-ār-foṇ), a village of France, dep. Oise, near Compiegne, remarkable for its castle, founded in 1390 and recently restored. Pop. (1906) 1482.

Pierre-les-Calais, St. See *Calais.*

Pierrot (pi-er-rō), a comic character on the French stage, dressed like a harlequin, and playing the part of a cunning but cowardly rogue.

Pierrepont (pēr'pont), Edwards, statesman, was born at North Haven, Connecticut, in 1817; died in 1892. He studied law and became eminent in his profession, was made a judge of the Superior Court of New York in 1857, and attorney-general of the United States in 1875. In 1876 he was appointed United States Minister to Great Britain.

Piers Plowman. See *Langlande.*

Pietà (pē-ā-tà'), in painting and sculpture, a representation of the Virgin embracing the dead Christ. In St. Peter's at Rome is a Pietà by Michael Angelo.

Pietermaritzburg (pē-tėr-mår'-itz-burg), capital of Natal, 45 miles inland from Durban, with which it is connected by a railway. It was founded in 1843, and named after two of the Boer leaders, Pieter Retief and Gertz Maritz. It is regularly built, with wide streets planted with trees, contains the governor's residence and government buildings, etc. Pop. (1904) 31,119.

Pietism (pī'e-tizm), in German theology the religious views of the *pietists*, a name originally applied in derision to some young teachers of theology at Leipzig, who began in 1689 to deliver ascetic lectures on the New Testament to the students and citizens. The idea of imparting theological instruction in a popular way came from their friend and teacher Spener (the German Fénelon), who had held religious meetings in Frankfort from the year 1670, at which the laity prayed, and were allowed to ask questions, etc. The Leipzig lectures were put a stop to as being hostile to good government, but the influence of the pietists led to the foundation (1695) of the University of Halle, which became the center of evangelical religion in Germany. The leading adherents of Spener were appointed its first professors, among them Francke, the founder of the celebrated Waisenhaus or orphanage at Halle. The pietists were noted for their preference of practical as opposed to doctrinal religion, but they never formed a separate sect. The Jansenism and Quietism of France and the Methodism of England sprang from sources similar to those of the German pietism.

Pietra-dura (pi-ā'tra dö'ra), a kind of mosaic executed in Italy, and especially at Florence, in hard stones, such as topazes, garnets, carnelians, rubies, etc.

Piezometer (pī-e-zom'e-tėr), an instrument for measuring the compression of water and other liquids under pressure. In Oersted's piezometer the pressure is gauged by the manometer, and the amount of compression indicated by mercury in a glass tube.

Pig. See *Hog.*

Pigafetta (pē-ga-fet'a), Antonio, born at Vicenza towards the end of the 15th century, accompanied Magellan in the first circumnavigation of the globe (1519–22). He kept a journal of the voyage, of which a complete edition was first published only in 1800.

Pigeon (pij'un), the common name of a group of birds, forming in some systems a section of the order of rasorial or gallinaceous birds, in others a distinct order. The pigeons or doves as a group have the upper mandible arched towards its apex, and of horny consistence; a second curve exists at its base, where there is a cartilaginous plate or piece through which the nostrils pass. The crop is of large size. The pigeons are generally strong on the wing. They are mostly arboreal in habits, perching upon trees, and building their nests in elevated situations. Both sexes incubate; and these birds generally pair for life; the loss or death of a mate being in many cases apparently mourned and grieved over, and the survivor frequently refusing to be consoled by another mate. The song consists of the well-known plaintive *cooing*. The pigeons are distributed in every quarter of the globe, but attain the greatest luxuriance of plumage in warm and tropical regions. The pigeon family is divided into various groups. The true pigeons or Columbidæ are represented by the stock-dove, the common wild pigeon, from which, it was once supposed, most of the beautiful varieties of the *Columbidæ*, which in a state of domestication are dependent upon man, derived their origin; but it is now believed the rock-dove is the parent stock. The passenger-pigeon was formerly very

abundant in North America. The numbers that sometimes moved together were vast beyond conception. Millions of these pigeons associated together in a single roost. They were, however, destroyed by hunters so indiscriminately that they have largely disappeared. The house-pigeons, tumblers, fantails, pouters, carriers, and jacobins are the chief varieties of the rock-pigeon, and have been employed by Darwin (see his *Origin of Species* and his *Animals under Domestication*) to illustrate many of the points involved in his theory of 'descent by natural selection.' Other species of pigeons are the *Treronidæ* or fruit-pigeons of India, the Eastern Archipelago, and Australia; the *Gouridæ* or ground-pigeons, the largest of the group, including the crowned pigeon (*Goura coronāta*) of the Eastern Archipelago. See also *Carrier Pigeon*, *Turtle-dove*, etc.

Pigeon-berry. Same as *Pokeweed.*

Pigeon English, conjectured to be a form of 'business English,' a conglomeration of English and Portuguese words wrapped in a Chinese idiom, used by English and American residents in China in their intercourse with the native traders.

Pigeon-pea, the fruit of the leguminous shrub *Cajanus Indicus*, a native of India, but now cultivated in tropical Africa and America. In India the pigeon-pea forms a pulse of general use. Called also *Angola Pea* and *Congo Pea.*

Pig-iron. See *Iron.*

Pigment-cell, in physiology, a small cell containing coloring matter, as in the choroid coat of the eye.

Pigments (pig'mentz), materials used for imparting color, especially in painting, but also in dyeing or otherwise. The coloring substances used as paints are partly artificial and partly natural productions. They are derived principally from the mineral kingdom; and even when animal or vegetable substances are used for coloring they are nearly always united with a mineral substance (an earth or an oxide). In painting the colors are ground, and applied by means of some liquid, which dries up without changing them. The difference of the vehicle used with the method of employing it has given rise to the modes of painting in water-colors, oil-colors, in fresco, in distemper, etc. For oil-painting mineral substances are more suitable than *lakes* prepared with minerals, because the latter become darker by being mixed with oil. The *lake* colors have tin or alum for their basis, and owe their tint to animal or vegetable coloring substances. Indigo is a purely vegetable color, as is also blue-black, which is obtained from burned vine-twigs. Ivory black is a purely animal color, being nothing else than burned ivory. In staining porcelain and glass the metallic colors which are not driven off by heat and are not easily changeable are used.

Pigmy. See *Pygmy.*

Pignerol. See *Pinerolo.*

Pignut. See *Earthnut.*

Pika (pī'ka), the calling-hare (*Lagomys*), an animal nearly allied to the hares, and forming the family Lagomydæ. It is found in Russia, Siberia, and North America, and is remarkable for the manner in which it stores up its winter provision, and also for its voice, the tone of which so much resembles that of a quail as to be often mistaken for it.

Pike (pīk), a genus of fishes belonging to the order Teleostei, and included in the Malacopterous division of the order. The pikes form the types of the family Esocidæ, in which group the body is lengthened, flattened on the back, and tapering abruptly towards the tail. One dorsal fin exists, this structure being placed far back on the body, and opposite the anal fin. The lower jaw projects. Teeth are present in plentiful array, and are borne by almost every bone entering into the composition of the mouth. The common pike (*Esox lucius*) occurs in the rivers of Europe and North America. It is fished chiefly for the sake of its flesh, which is accounted exceedingly wholesome. The pikes are very long-lived, and form the tyrants of their sphere, being the most voracious of fresh-water fishes. When fully grown the pike may attain a length of 5 or 6 feet, and there are numerous instances on record in which these fishes have greatly exceeded that length. The sea pikes (*Esox belŏne*), also known as garpikes, are also included in the family Esocidæ. (See *Garfish.*) The saury pike (*Scomberesox saurus*) resembles the garpike in general conformation, but possesses the dorsal and anal fins in the shape of a number of divided 'finlets.' The bony pike (*Lepidosteus osseus*) of North American lakes and rivers belongs to an entirely different order of fishes — that of the Ganoidei. See *Bony Pike.*

Pike, a sort of lance, a weapon much used in the middle ages as an

arm for infantry. It was from 16 to 18 feet long, and consisted of a pole with an iron point. For some time every company in the armies of Europe consisted of at least two-thirds pikemen and one-third harquebusiers. Gustavus Adolphus omitted the pikemen in some regiments entirely. The invention of the bayonet drove the pike out of use.

Pike, Albert, poet, was born at Boston, Massachusetts, in 1809; died in 1891. He settled in Arkansas, became a lawyer, and was attorney for the Cherokee Indians. He served in the army during the Mexican war, and organized some Indian regiments during the Civil war, leading them in the battle of Pea Ridge and Elkhorn. After the war he was for a time editor of the Memphis *Appeal.* In 1893 he published *Hymns of the Gods,* and subsequently other poems. He also wrote works on Masonry.

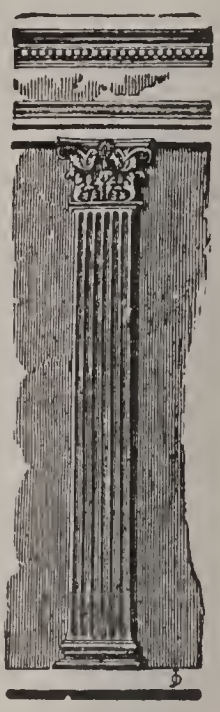
Pike, Zebulon Montgomery, soldier and explorer, born at Lamberton, New Jersey, in 1779. He entered the army, and in 1805 led an expedition sent by the government to trace the Mississippi to its source, and subsequently made expeditions in the West, discovering Pike's Peak, and reaching the Rio Grande. He was appointed brigadier-general in 1813, and on April 13 of that year was killed during an attack on York (now Toronto) in Canada.

Pike-perch (*Lucioperca*), a genus of fishes closely allied to the perch, but showing a resemblance to the pike in its elongated body and head. Like the pike, it is a dangerous enemy to other fresh-water fishes, but the flavor of its flesh is excellent. In Europe it occurs in two species. It also occurs in the fresh waters of the United States, such as the great lakes, the Upper Mississippi, and the Ohio.

Pike's Peak, one of the highest summits of the Rocky Mountains (14,134 feet), in the center of the state of Colorado. It was discovered by General Z. M. Pike in 1806. It abounds in rich gold-bearing quartz, and has a meteorological observatory. A rackrail line of railway, 9 miles long, to top of mountain, is operated during the summer months.

Pikul. See *Picul.*

Pilaster (pi-las'tẽr), a square pillar projecting from a pier or a wall to the extent of from one-fourth to one-third of its breadth. Pilasters originated in Grecian architecture. In Roman they were sometimes tapered like columns and finished with capitals modeled after the order with which they were used. See *Column.*



Pilaster—Corinthian.

Pilate (pī'lat), Pontius, the sixth Roman procurator of Judæa. He succeeded Valerius Gratus in A.D. 26. Nothing is known of his early history. He was a narrow-minded and impolitic governor, and at the very beginning of his term of office led to commotions among the Jews at Jerusalem. When Christ had been condemned to death by the Jewish priests, who had no power of inflicting capital punishments, he was carried by them to Pilate to be executed. Yielding to the clamors of the Jews the Roman governor ordered Jesus to be executed, but permitted Joseph of Arimathea to take his body and bury it. Pilate was afterwards removed from his office by Vitellius, prefect of Syria (A.D. 36), and, according to tradition, was banished by Caligula to Vienna (Vienne), in Gaul, where he is said to have died or committed suicide some years after.

Pilatus (pē-lä'tös), Mount, a mountain in Switzerland, on the borders of the cantons of Lucerne and Unterwalden. Its loftiest peak, the Tomlishorn, attains a height of 7116 feet. It is almost as great a favorite with mountain climbers as the Rigi on account of the imposing views of the Bernese mountain scenery obtained from various points. A railway to the summit was opened in 1889.

Pilchard (pil'chard; *Clupea pilchardus*), a species of fishes included in the family and genus of the herrings (Clupeidæ), which they much resemble, though rather smaller. The usual spawning time is October. They are found in greatest plenty on the southern coasts of England, the Cornwall pilchard fisheries being those best known and most celebrated. Pilchards are chiefly consumed in Spain, Italy, and France during Lent and other fasting seasons. Many of the commercial 'sardines' are in reality young pilchards, the sardine (which see) being also included in the herring genus.

Pilcomayo (pēl-kō-mä'yō), a river in South America, which rises in Bolivia, on the eastern declivities of the Andes, and falls into the

Paraguay, near Asuncion, after forming the boundary between Paraguay and the Argentine Republic. Its entire length is between 1500 and 1600 miles. On account of its shallowness during the dry season and the great current in its narrow parts it does not appear likely to become usefully navigable.

Piles. See *Hemorrhoids.*

Piles (pīlz), in works of engineering, are used either for temporary purposes or to form a basis for permanent structures. In the former case they are usually squared logs of wood sharpened at the point, which is sometimes protected with an iron shoe to enable it to penetrate the harder strata which it may meet with in being driven into the ground. The most usual purpose to which piles are applied in temporary structures is to make cofferdams. The permanent purposes for which piles are employed are various. In many cases the object is to secure a firm foundation in a loose or swampy soil. In these cases the piles used are now often of cast-iron, sometimes solid and sometimes hollow. Piles are driven in by a heavy block raised and let fall alternately, this in extensive works being accomplished by means of steam machinery.

Pilewort. See *Celandine.*

Pilgrimage of Grace, an insurrectionary movement in the north of England, in 1536–37, subsequent upon the proceedings of Henry VIII in regard to the church. The insurgents demanded the fall of Cromwell, redress to the church, and reunion with Rome. Mustering to the number of 30,000, they marched upon York, and within a few days were masters of England north of the Humber. Henry temporized, promising a free parliament at York; but when the insurgents returned home all concessions were revoked, and a renewal of the revolt was suppressed with great rigor. Many perished by the block, the gibbet, and the stake.

Pilgrimage (pil'gri-mij), a journey to a sacred place. The practice of making pilgrimages to places of peculiar sanctity is as ancient as it is widespread. The ancient Egyptians and Syrians had privileged temples, to which worshipers came from distant parts. The chief temples of Greece and Asia Minor swarmed with strangers. But it is in Christianity and Mohammedanism that the practice has attained its greatest development. The first Christian pilgrimages were made to the graves of the martyrs. By the end of the fourth and beginning of the fifth century the custom had become so general as to lead to abuses. Throughout the middle ages, and especially about the year 1000, the religious fervor of the people manifested itself in numerous pilgrimages, especially to Jerusalem. The outrages inflicted on the Christian pilgrims by the Saracens led to the Crusades, which were themselves nothing else than gigantic armed pilgrimages. The shrine of Our Lady of Loretto, near Rome, that of St. James of Compostella in Spain, of St. Martin of Tours in France, were all sacred spots to which, from the tenth to the thirteenth century, and even much later, pilgrims resorted in innumerable crowds; and from the end of the twelfth century the shrine of St. Thomas A Becket at Canterbury had the same honor in England. After the Reformation the practice of making pilgrimages fell more and more into abeyance, and the spirit which led to it seems almost to have become extinct among Christians, although there are still occasional outbursts of it among the Roman Catholics, as in the modern pilgrimages to Paray-le-Monial, Lourdes, Iona, and Holy Island. In the Greek church Mount Athos is the chief shrine of pilgrimage. For Mohammedans the great place of pilgrimage is Mecca, which was the resort of Arabian pilgrims long before the time of Mohammed. Among the Hindus and the Buddhists also the practice of performing pilgrimages largely prevails.

Pilgrim Fathers, the name given to the emigrants who, in order to escape from religious persecution, sailed from Southampton in the *Mayflower*, landing at what is now Plymouth in Massachusetts, in December, 1620, thus colonizing New England. They numbered 100 men, women, and children.

Pilibhît (pē-lē-bēt'), a town in India, in the district of Bareilly, in the Northwest Provinces, 30 miles northeast of Bareilly city, on the Desha River, the entrepôt for an extensive traffic between the upper and lower countries. The most important industry is sugar refining. In 1740 it was seized by the Rohilla leader, Háfiz Rahmat Khán, who made it his capital. In the western outskirts stand his cathedral-mosque and the remains of his palace. Pop. about 35,000.

Pillar. See *Column.*

Pillar-Saints. See *Stylites.*

Pillau (pil'ou), a fortified seaport of East Prussia, at the entrance of the Frishes Haff, 25 miles w. s. w. of Königsberg, with which it forms one port. Large vessels for Königsberg are partially unloaded at Pillau. Pop. 7374.

Pillory (pil'u-ri), a frame of wood erected on posts, with movable boards, and holes through which were put the head and hands of a criminal for punishment. In this manner persons were formerly exposed to public

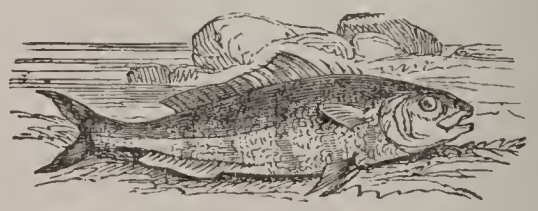
Pillory.

view, and generally to public insult. It was a common punishment in Britain for forestallers, users of false weights, those guilty of perjury, forgery, libel, seditious writings, etc. It was abolished in 1837.

Pills (pilz), medicines made up in globules of a convenient size for swallowing whole, the medicine being usually mixed up with some neutral substance such as bread-crumbs, hard soap, extract of liquorice, mucilage, syrup, treacle, and conserve of roses. The coverings are liquorice powder, wheat flour, fine sugar, and lycopodium. In many cases pills are now enameled or silvered, which deprives them of most of their unpleasantness. Pills are a highly suitable form for administering medicines which operate in small doses, or which are intended to act slowly or not to act at all until they reach the lower intestines, and in some other cases.

Pilot (pī'lut), a person qualified to navigate a vessel within a particular district. By the existing law, oversea vessels must employ a pilot in those parts of the voyage where a pilot is employed by regulation or usage. A master refusing to take a pilot vitiates the insurance on the vessel; while a pilot refusing to perform the duty for which he is licensed renders himself liable to penalties. The master or owner of a vessel is not responsible for damage caused by the fault or incapacity of any qualified pilot where the employment of such pilot is compulsory; but the pilot must not be interfered with in the discharge of his duties. Pilotage fees depend on the distance and the draught of water of the vessel piloted. Masters and mates passing the requisite examination are entitled to pilotage certificates to conduct their own vessels. Laws regulating pilotage have been enacted by the several maritime states — this power being controlled by Congress. The pilot laws of the states are different, some being unjust and burdensome, especially as to sailing vessels; while others are fair and equitable. A sailing or steam-vessel engaged in foreign trade must pay for a pilot even when one is not employed. The compulsory pilotage system is being abolished in many large foreign seaports, without detriment to the general safety of navigation.

Pilot-fish (*Naucrătes* or *Scomber ductor*), a genus of Teleostean fishes included in the Scomberidæ or mackerel family, and sometimes included in the same genus (*Scomber*) as the mackerel itself. The pilot-fish was formerly supposed to act as a pilot to the mariner, and is still


Pilot-fish (*Naucrătes ductor*).

supposed to act as such to sharks. It often follows in the wake of ships for long distances, associating with sharks and devouring the refuse thrown overboard. The average length is about 12 inches. In general form it resembles the mackerel.

Piloty (pē-lō'tē), Karl, a German painter, born at Munich in 1826; died in 1886. He studied at the Academy of Munich, and gained fame by his picture of *The Founding of the Catholic League* (1854). In 1856 he was appointed a professor in the Munich Academy of Arts. He devoted himself chiefly to historical subjects, and among his works are: *Seni by the Dead Body of Wallenstein; Nero among the*

Ruins of Rome; Mary Queen of Scotland receiving her Death Sentence; The Murder of Cæsar; Thusnelda in the Triumph of Germanicus; The Wise and Foolish Virgins; The Death of Alexander the Great. Piloty is reckoned the most remarkable representative of the realistic school of Germany.

Pilpay. See *Bidpai.*

Pilsen (pil'sen), a town in Western Bohemia, at the confluence of the Mies and Radbusa, 53 miles southwest of Prague. It consists of the town proper, with promenades on the site of the old ramparts, and of three suburbs. The principal buildings are the church (1292), town-house, real-school, and theaters. The chief article of manufacture and commerce is beer. Coal, iron, alum, etc., are worked in the neighborhood. The second town of Bohemia, Pilsen dates from 1272. During the Thirty Years' war it was for a time the headquarters of Wallenstein. Pop. 68,292.

Pilum. See *Javelin.*

Pimelodus (pim-i-lō'dus), a genus of malacopterygian abdominal fishes, found chiefly in South America, the Nile, and some of the eastern rivers, and supposed to abound in subterranean lakes, as one species (*P. cyclōpum*), 6 inches long, is sometimes ejected in thousands from the craters of volcanoes.

Pimen'to, or PIMENTA. See *Allspice.*

Pimpernel (pim'pėr-nel; *Anagallis*), a genus of plants belonging to the nat. order of Primulaceæ. The *Anagallis arvenis*, or field pimpernel, a beautiful annual, is commonly known in England (where the scarlet-flowered variety is by far the most common) as the 'shepherd's or poor man's weather-glass,' from the fact that its flowers do not open in rainy weather. The blue and lilac varieties of the *Anagallis collīna*, originally a native of South Africa, have been introduced into gardens, where they have a fine effect. The water pimpernel is the *Veronica Anagallis;* the yellow pimpernel, *Lysimachia nemŏrum.*

Pimpinella. See *Anise.*

Pin, a piece of wire, generally brass, sharp at one end and with a head at the other, chiefly used by women in fastening their dress. By the old methods of manufacture by hand, the distinct processes, from the straightening of the wire to the spinning and hammering of the head, were usually said to be fourteen. Among the most important improvements introduced in the fabrication of pins are the machines by which the head is formed from the pin itself, and the machine for sticking the pins in paper — both American inventions. Solid-headed pins, now universally used, were first made in 1824. The consumption of pins in the United States is estimated at thirty millions a day.

Piña Cloth (pē'nya), a costly fabric made in Manila from the unspun fibers of the leaves of the cultivated pineapple plant (*Ananassa sativa*). Its color is almost white, but has a slight tinge of yellow in it. In spite of the delicacy of its texture it is remarkably strong. Its chief use is for making ladies' pocket handkerchiefs, but it is sometimes also used for dresses. It is frequently adorned with exquisite embroidery.

Pinacothek, or PINAKOTHEK (pi-na-kō-thek'; Gr. *pinakothēkē*), a name sometimes applied in Germany to galleries of art, especially collections of paintings. The Pinacothek formed by Louis I of Bavaria at Munich is particularly famous.

Pinar del Rio (pē-nar' del rē'ō), the most westerly province of Cuba, bordering Havana province on the east. It is mountainous N. and W., low and marshy on the coast. Rivers and lakes are numerous, some of the rivers flowing underground. This province contains the fertile Vuelta Abajo district, in which grows the finest tobacco in the world. Sugar-cane, coffee, rice, sea-island cotton, corn, fruits, and fine woods are produced. Stock raising and fishing are also important industries.

Pinar del Rio, a city, capital of above province. It is 95 miles W. S. W. of Havana, is in the center of the Vuelta Abajo district, and has an active trade in tobacco. Its seaport is Coloma, at the mouth of Coloma River, on the S. coast 14 miles away. Pop. 8880.

Pinchot, GIFFORD, forester, born at Simsbury, Connecticut, in 1865. He was graduated at Yale in 1889, studied forestry in Europe, was made a member of the National Forest Commission in 1896, and was chief forester of the United States, 1898-1910. In the latter year he was dismissed by President Taft as a result of the Ballinger controversy concerning the Alaskan coal deposits. He has been professor of forestry at Yale since 1903 and president of the National Conservation Association since January, 1910.

Pinckney (pink'ni), CHARLES COTESWORTH, statesman, was born at Charleston, South Carolina, in 1746. In the Revolutionary war he displayed resolution and intrepidity, and for two years suffered rigorous confinement. In 1787 he was a member of the convention that framed the Constitution. Washington in 1795 offered him the place of Secretary of War, and afterwards that of Secretary of State, in his cabinet, both of which he declined. He was sent to France as minister in 1796, and met a suggestion of obtaining certain advantages for his country by bribery with the striking utterance, 'Millions for defense, but not one cent for tribute.' He was appointed a major-general about 1798 and was a candidate of the Federal party, with John Adams, for the presidency in 1800, but was defeated. He died in 1825.

Pindar (pin'dăr; PIN'DAROS), the greatest of the lyric poets of Greece, born in Bœotia, in or near Thebes, of a noble family, about 522 B.C. At an early age he was instructed in music and poetry; and for the development of his poetical talent he was sent to Athens, where he became the pupil of Lasus of Hermione, the founder of the Athenian school of dithyrambic poetry. In after-life he showed himself a great admirer of Athens and the Athenians, who rewarded him for the honors he paid to them by making him a public guest of the city and giving him a present of 10,000 drachmas, and after his death erected a statue in his honor. He was held in great honor by many princes of Greek states, for whom he composed choral songs, and had close relations with Delphi. Little is known with certainty of his life; even the date of his death is doubtful. The most probable account appears to be that he died at the age of eighty, in which case his death would fall about 442 B.C. He practiced all kinds of lyric poetry, and excelled equally in all. His works embraced hymns to the gods, pæans, dithyrambs, dancing and drinking songs, dirges, panegyrics on princes, and odes in honor of the victors in the great Grecian games, but the only poems of his which have come down to us entire belong to the last class, the Epinicia. Forty-five of the epinician odes of Pindar are still extant. Fourteen of these are in celebration of Olympic victors, twelve of Pythian, eleven of Nemean, and eight of Isthmian.

Pindar, PETER. See *Wolcott.*

Pindarees (pin'da-rēz; that is, *freebooters*), the name given in British India to the hordes of mounted robbers who for several years after 1812 infested Central India. They were descended mostly from the caste of Mohammedan warriors, which formerly received high pay from the Indian princes, and they were secretly excited by the Indian tributaries to attack the company. In 1817 the British governor-general, the Marquis of Hastings, determined on the destruction of these robbers, whose force was estimated at 40,000 horse. Attacked on all sides, they were conquered and dispersed. Garrisons were placed in some fortresses, and the native states of the infested district were formally taken under British protection.

Pind Dadan Khan, a prosperous commercial town, Jhelum district, Punjab, British India, near the north bank of the Jhelum River, with a trade in salt. Pop. 13,770.

Pindus (pin'dus), the ancient name of the principal mountain range of Northern Greece, forming the watershed of the country and the boundary between Thessaly and Epirus. It was, like Helicon and Parnassus, a seat of Apollo and the Muses.

Pine (pīn), the popular name of trees of the genus *Pinus*, natural order Coniferæ, which is divided into two suborders, namely, 1. *Abietineæ*, the fir tribe; and 2. *Cupressineæ*, the cypress tribe. The pines belong to the former section, and are distinguished from the spruce, larch, fir, cedar, etc., chiefly by having persistent leaves in clusters of two to five in the axils of membranous scales. All the European species, except *P. Cembra*, have only two leaves in a sheath; most of the Asiatic, Mexican, and California kinds have three, four, or five leaves, and those of the United States and Canada have generally three. The cones also afford an important ready means of distinction and classification. The Scotch pine or fir (*P. sylvestris*) is a tall, straight, hardy tree, from 60 to 100 feet high; a native of most parts of Europe, flowering in May and June, and having many varieties. There are extensive forests of it in Russia, Poland, Sweden, Norway, Germany, the Alps, the Pyrenees, and the Vosges. In Scotland it grows at the height of 2700 feet on the Grampians. The Corsican pine (*P. Laricio*) grows to a height of from 80 to 100 feet, and in the island of Corsica it is said to

reach an altitude of 140 to 150 feet. The pinaster, or cluster pine (*P. pinaster*), is indigenous to the south of Europe, to the west of Asia, the Himalayas, and, it seems, even to China. It is a large, handsome, pyramidal tree, varying from 40 to 60 feet in height. Its cones point upwards, in star-like clusters, whence the name of pinaster or star pine. In France, especially between Bayonne and Bordeaux, it covers immense tracts of barren sand, in which it has been planted to prevent the sand from drifting. The stone pine (*P. pinča*) is a lofty tree in the south of Europe, where it is a native; its spreading head forms a kind of parasol; the trunk is 50 or 60 feet high, and clear of branches. Sabine's pine (*P. Sabiniāna*) was discovered in California in 1826. The leaves are in threes, rarely in fours, from 11 to 14 inches long; the trees are of a tapering form, straight, and from 40 to 120 feet high, with trunks from 3 to 12 feet in diameter. The Cembran pine (*P. Cembra*) is a native of Switzerland and Siberia. The red Canadian pine (*P. resinōsa*), or yellow pine, inhabits the whole of Canada from the Atlantic to the Pacific, and is also found in the northern and eastern parts of the United States. The trunk rises to the height of 70 or 80 feet by about 2 in diameter at the base, and is chiefly remarkable for its uniform size for two-thirds of its length. The wood is yellowish, compact, fine-grained, resinous, and durable. The true yellow pine (*P. variabĭlis*) abounds in the Atlantic states from New Jersey to Virginia, and rises to the height of 50 or 60 feet, by 15 or 18 inches in diameter at base. The cones are small, oval, and armed with fine spines. The timber is largely used in shipbuilding and for house timber. The white pine (*P. strobus*) abounds chiefly from lat. 43° to 47° and southward to the Alleghanies. The timber is not strong, but is easily wrought and durable, and its timber is consumed in much greater quantity and for a wider variety of purposes than any other. The demand for it has been so great that the former great white pine forests are almost denuded. The Labrador or Banks's pine (P. *Banksiāna*) is usually a low, straggling tree, growing among barren rocks to a height of from 5 to 8 feet, but may attain three times that height. The cones are recurved and twisted, and the leaves are regularly distributed over the branches. In Nova Scotia and the state of Maine it is known as the scrub pine, and in Canada as the gray pine. The other American pines are the Jersey pine (*P. inops*), the trunk of which is too small to be of any utility in the arts; the pitch pine (*P. rigida*), which is most abundant along the Atlantic coast, and the wood of which, when the tree grows in a dry, gravelly soil, is compact, heavy, and contains a large proportion of resin; the loblolly pine (*P. tæda*), the timber of which decays speedily on being exposed to the air; the long-leaved pine (*P. palustris*), which abounds in the lower part of the Carolinas, Georgia, and Florida, furnishing resin, tar, pitch, and turpentine, and timber which is hardly inferior to the white oak in naval architecture; and Lambert's pine (*P. Lambertiana*), which grows between the fortieth and forty-third parallels of latitude, and about 100 miles from the Pacific. It is of gigantic size, the trunk rising from 150 to upwards of 200 feet, and being from 7 to nearly 20 feet in diameter.

Pineal Gland (pin′e-al), in anatomy, is a body (not properly a gland) forming part of the brain. It is about the size of a pea, and is connected with the cerebrum at its base by four peduncles or stalks and by some few cross-fibers. Its function is not known. It was considered by the ancients to be the seat of the soul.

Pineapple (*Ananassa satīva*), a plant belonging to the nat. order of Bromeliaceæ, much esteemed for its richly-flavored fruit, which somewhat resembles a pine-cone. A native of tropical America, it is now naturalized in many hot countries, is grown in the warmer regions of the United States, and is also cultivated in hothouses. It is largely grown in Hawaii and exported in the canned state to the United States. The common pineapple plant yields the fiber of which, in Manila, the beautiful piña cloth is made. (See *Piña Cloth.*) The fiber is also used for textile purposes in China and India.

Pineapple fruit.

Pine Bluff, a city, capital of Jefferson county, Arkansas, is situated on the Arkansas River, 71 miles

above its mouth. It is in the cotton section of the state and has a large trade in cotton, also large railroad shops, extensive ironworks, and various other manufactures. Pop. 15,102.

Pine-chafer, or PINE BEETLE (*Hylophăgus piniperda*), a species of beetle which infests Scotch pines. It feeds on the young shoots of these trees and eats its way into the heart, thus converting the shoot into a tube.

Pine-finch, or PINE-GROSBEAK (*Pinicŏla* or *Pyrrhŭla enucleātor*), a genus of conirostral perching birds or Insessores, belonging to the subfamily of the bullfinches (*Pyrrhulīnæ*). It is of larger size than the common bullfinch, and measures from 8 to 9 inches in length. It occurs in the Arctic and northern regions of both Old and New Worlds. It is more rarely found in the temperate portions of Europe. Its song notes are agreeable, and its flesh is esteemed in Russia.

Pinel (pē′nel), PHILIPPE, the Howard of the insane, was born in 1745, at St. André, in the French department of Tarn, and studied at Toulouse (where he took his doctor's degree in 1773) and Montpellier. In 1778 he went to Paris, and in 1791 came into notice by his treatise *Sur l'Aliénation Mentale*. In the following year he was made directing physician at the Bicêtre, and in 1794 at Salpêtrière. By his writings and by his management of these two asylums, in which he introduced the humane treatment of the insane, Pinel laid the foundations of the great reform that has been effected in treating mental diseases. He died at Paris in 1826.

Pine-resin, a resin contained in the juice which exudes from pines, firs, and other coniferous trees. These resins generally contain oxygen with volatile oils, and sometimes acid bodies.

Pinero (pi-nē′rō), ARTHUR WING, actor and dramatist, son of a solicitor, was born in London in 1855, and made his *début* upon the stage at Edinburgh in 1874, subsequently joining the Lyceum and Haymarket companies. He is the author of several successful plays, including *The Squire*, *Sweet Lavender*, *The Second Mrs. Tanqueray*, *The Princess and the Butterfly*, etc.

Pinerolo (pē-nā-rō′lō; French, *Pignerol*), an ancient city of Italy, province of Turin, 21 miles southwest of the city of that name, at the mouth of the Val Clusone. It has a cathedral, bishop's palace, lyceum, technical school, etc. The manufactures are chiefly cotton, woolen, and silk goods. It belonged to Savoy from 1042, but the French held it for a series of years on several occasions; and its citadel was at one time the prison of the Man with the Iron Mask. Pop. 12,608.

Pine Wool, the fine fibers of the leaves of the pine tree. The preparation of this material is chiefly carried on in Germany and Sweden. It is used for making wadding, a coarse kind of blanket, stuffing cushions, mattresses, etc.

Piney Tallow, called also Malabar tallow, is a fatty substance resembling wax, obtained by boiling with water the fruit of the *Vateria Indica*, a tree common on the Malabar coast. It forms excellent candles.

Piney Varnish, a resin used as a varnish, obtained from two trees of S. India and Ceylon, *Vateria Indica* and *V. acuminata*. It is known also as piney resin, white dammar, and Indian coral, and is got by making incisions on the bark of the tree or into its substance. It is soluble in turpentine and drying oils.

Ping Pong, table lawn-tennis, introduced from England to the United States in the early twentieth century and for a time very popular. It is played in a room, but resembles the regular game of tennis.

Pingree (pin′grē), HAZEN S., reformer, born at Denmark, Maine, in 1842; died in 1901. He served in the Civil war; engaged in the shoe business in Detroit, and became very successful. Elected mayor of Detroit in 1889, on the Reform ticket, he excited much attention by his opposition to street railway methods, and instituted an interesting plan for employing applicants for charity. He was elected governor of Michigan in 1897, and again in 1898.

Pinguicula (pin-gwik′ū-la), a genus of plants of the natural order Lentibulariaceæ, with rosettes of fleshy radical leaves, and solitary purple, violet, or yellow flowers. See *Butterwort*.

Pinion (pin′yun), in machinery, a small wheel which plays in the teeth of a larger one, or sometimes only an arbor or spindle in the body of which are several notches forming teeth or leaves, which catch the teeth of a wheel that serves to turn it round.

Pink (*Dianthus*), a genus of plants belonging to the natural order Caryophyllaceæ. More than 100 species are known, all, with perhaps one or two exceptions, natives of the northern and

temperate parts of the European continent. Their roots are annual or perennial; the stems herbaceous and jointed; the leaves opposite and entire, and the flowers terminal, aggregate, or solitary, and always beautiful. The clove pink or carnation, and the garden pink, of which there are many varieties, are familiar species.

Pinkerton (pin'kėr-tun), ALLAN, detective, born at Glasgow, Scotland, in 1819; died in 1884. He migrated to Canada in 1840 and went to Chicago in 1850, where he joined the detective department. He subsequently organized the detective agency which bears his name. He wrote interesting stories of his experiences as a detective.

Pinkerton, JOHN, a Scottish antiquary, born at Edinburgh in 1758. He was articled to a writer to the signet, but in 1780 went to London to devote himself to literature, and by his *Letters on Literature* obtained the acquaintance of Horace Walpole. His more valuable publications are: *Ancient Scottish Poems*, from the Manuscript Collection of Sir Richard Maitland of Lethington, with Notes and a Glossary (1786); *Inquiry into the History of Scotland preceding the Reign of Malcolm II or 1056* (1790), containing a curious discussion of the 'Pictish question'; *The Medallic History of England; Scottish Poems*, reprinted from scarce editions; and a *General Collection of Voyages and Travels* in 19 large volumes. He died at Paris in 1826.

Pin-money, an annual sum of money, sometimes provided for in a marriage settlement, to be paid by the husband to the wife for her separate use, and to be applied in the purchase of apparel, ornaments for her person, or for private expenditure.

Pinna (pin'a), or WING SHELL, a genus of Lamellibranchiate Mollusca included in the family Aviculidæ. The genus is represented by the *Pinna pectināta* of the British coasts, by the *P. nobilis* of the Mediterranean Sea, by the *P. bullāta*, *P. rudis*, *P. nigrīna*, and by other species. Some species attain large dimensions, being as much as 2 feet long. The 'byssus,' by which they adhere to rocks, is remarkably long, and of strong, silky texture, and is capable of being woven into cloth upon which a very high value is set. This manufacture was known to the ancients, and is still practiced in Italy to some extent.

Pinnace (pin'as), a small vessel used at sea. It is equipped with sails and oars, and also has two or three masts which are schooner-rigged. One of the boats of a man-of-war, used to carry the officers to and from the shore, is also called the pinnace. It is usually rowed with eight oars.

Pinnacle (pin'a-kl), in architecture, any lesser structure that rises above the roof of a building, or that caps and terminates the higher parts of angles or of buttresses. The application of the term is now generally limited to an ornamental pointed mass rising from angles, buttresses, or parapets, and usually adorned with rich and varied devices. They are usually square in plan, but are sometimes octagonal, and in a few instances hexagonal and pentagonal. The tops are generally crocketed, and have finials on the points.

Pinnacle, Trinity Church, Cambridge.

Pinnate (pin'āt), in botany, formed like a feather. A pinnate leaf is a species of compound leaf wherein a single petiole has several leaflets or pinnules attached to either side of it.

Pinnate Leaf.

Pinnated Grouse, known also as the prairie hen, or prairie chicken, a common game bird in the Mississippi Valley, north of Louisiana. The male is remarkable as possessing two erectile tufts in the nape, and an air bladder (connected with the windpipe, and capable of inflation) on each side of the neck, in color and shape resembling small oranges; general plumage brown, mottled with a darker shade.

Pinnigrada (pin-i-grā'da), or PINNIPEDIA, a section of the carnivorous order of mammals, in which the fore and hind legs are short, and are expanded into broad-webbed swimming paddles. The section comprises the seals and walruses.

Pinocle, PINOCHLE (pin'o-kl), a card game resembling the French game of bezique, of late years very popular in sections of this country. It is usually played with parts of two packs of cards, from the nines to the aces, or more recently from the sevens. The values range as follows: Ace, ten, king, queen, knave, and nine. Game is counted by marriages (king and queen of one suit), fours (aces, kings, etc.), pinocle (queen of spades and knave of dia-

monds), deuce (nine of trumps), and by trump sequence (knave to ace). Each of these counts has its special value. Game is also counted from tricks taken, each ten, ace, and king counting ten points. When played by three or more players, the melds or counts are declared before the play begins.

Pinos, ISLA DE. See *Isla de Pinos.*

Pinsk, a town of Western Russia, in the government of Minsk, on the navigable river Pina. It stands among marshes, and is built of wood. It has an active transit trade. Pop. 28,028. — The Pinsk Marshes, which cover an immense extent of country, are now in process of being drained.

Pint (pīnt), a measure of capacity used for both liquids and dry goods; it is the eighth part of a gallon, or 34.65925 cubic inches. The Scotch pint was equal to 3.0065 imperial pints.

Pintado. See *Guinea-fowl.*

Pintail Duck, a genus of ducks, so named from the elongated form of the tail-feathers. In size the common pintail duck (*Dafila acūta*) is equal to the mallard. These birds are common to the Mississippi Valley, and they occur on the Mediterranean coasts, in the Gulf of Mexico, in the West Indian Islands, and in Africa. They breed in confinement, and the flesh is savory.

Pinto (pēn'tō), MAJOR SERPA, a Portuguese traveler, born in 1846, and educated at the Royal Military College, Lisbon; entered the Portuguese army in 1863. In 1877–79 he crossed Africa from Benguela to Durban, and described his journey in a work entitled *How I Crossed Africa* (London, 1881), which procured him many honors, especially from geographical societies. He has led several exploring expeditions, and his proceedings in the Zambesi district led in 1890 to a vigorous and successful protest by Britain against the claims of Portugal in that quarter.

Pinturicchio (pin-tu̇-rik'yō; 'the little painter'), an eminent Italian painter of the Umbrian school, whose real name was BERNARDINO DI BETTO, was born at Perugia in 1454; died at Siena in 1513. He lived for a time at Rome, and while there was engaged on the frescoes of the Sistine Chapel, being at this time under the influence of Perugino. His chief work was a series of mural paintings illustrating the life of Pope Pius II (Æneas Silvius), in the cathedral library at Siena. There are also fine frescoes by him in the Buffalini Chapel of the Church of St. Maria in Araceli, Rome. He left many exquisite altar-pieces and other works in tempera; he never painted in oil.

Pinus. See *Pine.*

Pinzon (pēn-thon'), a family of Spanish navigators, natives of Palos, who were associated with Columbus in the discovery of America.— MARTIN ALFONSO, the eldest, was of great assistance to Columbus in fitting out his fleet, and in the voyage commanded the *Pinta.*— VICENTE YAÑEZ, his brother, commanded the *Niña* in the first voyage of Columbus.— FRANCISCO MARTIN, the third brother, was pilot of the *Pinta* in the first voyage of Columbus. From him descended the noble Spanish family of Pinzon.

Piombino (pē-ōm-bē'no), a town of Italy, province of Pisa, on the seacoast opposite the island of Elba. It has old fortifications, a good harbor, and manufactures of Bessemer steel and military projectiles. Pop. 5979. Piombino was formerly the capital of a small principality.

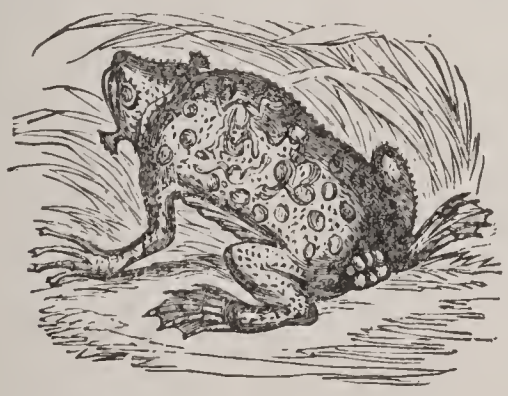
Piombo (pē-om'bō̤), SEBASTIANO LUCIANI DEL, a celebrated painter, born at Venice in 1485. He studied under Giovanni Bellini and Giorgione, whose fine coloring he imitated. Coming to Rome about 1512, he was induced by Michael Angelo to enter into rivalry with Raphael. When Raphael painted his celebrated *Transfiguration*, Sebastiano attempted to surpass it by painting the *Raising of Lazarus*, which is considered his greatest work, and is now in the National Gallery, London. Other important works are *The Scourging of Our Lord*, and *A Holy Family*. His chief merit, however, lay in single figures and portraits, such as his Clement VII. He was high in favor with Clement, who created him keeper of the papal seals. From this circumstance he derived his surname *Del Piombo*, the seals attached to the papal bulls being at that time of lead (*piombo*). He died in 1547. He preferred oil painting to fresco, and some of his later works are executed on slate.

Pioneers (pī-u-nērz'), laborers attached to an army for the making and repairing of roads, digging trenches, and preserving cleanliness in the camp when stationary, etc. A number of men are now attached to each corps as a permanent body of pioneers. In a general sense the word is applied to all those who precede others in any enterprise.

Piotrkov (pyotr'köf), a town of Russian Poland in the government of same name, one of the oldest towns of Poland. It was at one time the seat of the Polish diet, and the kings were elected here. Pop. 32,173.— The government has an area of 4729 sq. miles. It is moderately fertile, and has considerable manufactures of cottons and woolens. Pop. 1,406,951.

Piozzi (pē-oz'ē), HESTER LYNCH SALUSBURY, an English authoress, the daughter of John Salusbury of Bodville, Carnarvonshire, was probably born in 1741; died at Clifton in 1821. Early in life she was distinguished by her beauty and accomplishments. In 1763 she was married to Henry Thrale, a wealthy brewer of Southwark, London, which borough he then represented in parliament. Soon after her marriage she gathered round her a brilliant circle, including above all Dr. Johnson, who lived with the Thrales for sixteen years. Mr. Thrale dying in 1781, his widow, who was the mother of four daughters, married in 1784 Piozzi, a Florentine music-master, then resident in Bath. This alliance was keenly resented by all her friends, and Johnson entirely gave up her society. Her *Anecdotes of Dr. Johnson* appeared in 1786, and her *Letters* to and from Dr. Johnson in 1788. She also wrote a few poems, an autobiography, etc.

Pipa (pī'pa), a genus of toads, of which the best known species is the *Pipa Americana* of Surinam and Brazil, popularly designated the Surinam toad. The tongue and teeth are wanting in this family. The pipa is one of the



Pipa Toad (*P. surinamensis*).

most repulsive looking of the toads, and is noted as exemplifying, in the case of the female animals, an anomalous mode of developing the eggs and young. A number of pits or depressions termed 'dorsal cells' appear to be formed on the back of the female pipas at the breeding season. In each cell an egg is deposited, the eggs being first deposited by the female in water after the usual method, and being impregnated by the male, who then collects the eggs and places them in the female's back. Each cell appears to be closed by a lid-like fold, and within the cells the eggs are hatched and the young pass their tadpole state.

Pipe (pīp), a wine measure, usually containing very nearly 105 imperial or 126 wine gallons. Two pipes or 210 imperial gallons make a tun. In practice, however, the size of the pipe varies according to the kind of wine it contains. Thus a pipe of port contains (about) 138 wine-gallons; of sherry, 130; of Madeira, 110, etc.

Pipe, a tube for the conveyance of water, steam, gas, or other fluid, used for a great variety of purposes in the arts and in domestic economy. The materials of which pipes are made are also very various, wood, stone, earthenware, iron, lead, copper, leather, gutta-percha, etc., being all employed. Drainage and sewerage pipes of great strength and size (measuring from 1 or 2 up to 54 inches in diameter) are now usually made of fire-clay, glazed on their outer and inner surfaces. Large iron pipes are usually cast, and are used for the supply of water and gas.

Pipe, TOBACCO, a bowl and connecting tube, made of baked clay, wood, stone, or other material, and used in smoking tobacco. The chief processes in the manufacture of clay pipes are molding and baking. Finer and more expensive pipes are made of meerschaum, a somewhat plastic magnesian stone of a soft, greasy feel. Meerschaum pipe making is carried on to the greatest extent by the Germans, and Vienna may be said to be the center of the manufacture. Sometimes the bowl alone (which is frequently artistically carved) is of meerschaum, the stem being of wood, the best sorts of which are got from the young stems of the Mahaleb cherry, grown near Vienna, the mock orange of Hungary, and the jessamine sticks of Turkey. The stem, whether of the same material as the bowl or of wood, is usually provided with a mouthpiece of ivory, silver, or amber, the last being preferred. Briar-root pipes, with the bowl and stem of one piece of wood, and provided with amber, ivory, or bone mouthpieces, are now very common. They are made of the roots of a large variety of heath (Fr. *bruyère*). Many Germans and Dutchmen prefer pipes with porcelain bowls, which are sometimes beautifully painted in the style of fine chinaware painting. The Eastern

hookah is a pipe of great size, the bowl of which is set upon an air-tight vessel partially filled with water, and has a small tube which passes down into the water. The long flexible smoking-tube is inserted in the side of the vessel, and the smoke is made to pass through the water, being thus cooled and deprived of some noxious properties. Upon the American continent pipes have been in use from a very remote period. Indian pipes, with elaborately carved soapstone bowls and ornamented wooden stems, or entirely of baked clay, have been found in the ancient mounds of the West, together with other relics of an unknown race. See *Calumet.*

Pipe-clay, a fine white clay which is used for making tobacco pipes and articles of pottery, also for cleaning soldiers' belts, etc. See *Clay* and *Pipe* (*Tobacco*).

Pipe-fishes (*Syngnathus*), a genus of fishes included in the suborder Lophobranchii and nearly allied to the curious little fishes popularly known as 'sea-horses' (see *Hippocampus*). They are distinguished by a long and tapering body, and by jaws united to form a tube or pipe, bearing the mouth at the tip. The *Syngnathus acus* is one of the most familiar species. It averages 20 inches in length. The largest of the pipe-fishes is said to attain a length of 3 feet. A very remarkable circumstance in connection with the pipe-fishes consists

Great Pipe-fish (*Syngnathus acus*).

in the males of some species possessing a pouch-like fold, situated at the base of the tail, in which the eggs are contained after being extruded from the body of the females, and in which the young, after hatching, continue to reside for a time. The name pipe-fish is also applied to the members of the genus *Fistularia*, included in the Acanthopterous division of the Teleostei. The bones of the face are prolonged to form a tubular structure, at the extremity of which the mouth opens. The *Fistularia tabacaria* of the Antilles, averaging about 3 feet in length, represents this genus.

Piperaceæ (pī-pėr-ā'se-ē), the peppers, a natural order of shrubby or herbaceous exogenous plants, inhabiting the hottest parts of the globe, particularly India and South America. The general properties of the order are aromatic, pungent, and stimulant. The dried unripe fruits of *Piper nigrum* constitute black pepper. (See *Pepper.*) The fruit of *Cubeba officinālis*, a climbing plant of Java and other Indian islands, is the Cubeb pepper. (See *Cubebs.*) The leaves and unripe fruit of *Piper angustifolium* constitute the aromatic, fragrant, and astringent substance called *matico* or *matiea*, which has been recommended for checking hemorrhage. The leaves of *Piper Betle* (*Chaviea Betle*) are chewed in the East as a means of intoxication. (See *Betel.*) The root of *Macropiper methysticum* is the *kava* of the South Sea Islanders, and is used in the preparation of a stimulating beverage.

Pipette (pi-pet'), an instrument used by chemists, druggists, etc., consisting of a glass tube with a bulging expansion about the middle, into which a certain quantity of liquid may be sucked by the mouth or a rubber bulb, so as to be transferred from one vessel to another.

Piping Crow, a bird of New South Wales, remarkable for its musical powers, and for its power of mimicing the voices of other birds. It is the *Barita tibicen*, and by some naturalists is placed among the shrikes (Laniidæ), by others among the crows (Corvidæ).

Pipistrelle (pip-is'trel; *Vespertilio Pipistrella*), the familiar little bat which makes its appearance and flits about during twilight. It is of small size, and possesses a mouse-like body covered with hair, from which resemblance its popular name of Flitter-mouse has been derived. It passes the winter, like most other bats, in a state of torpidity; but appears to hibernate for a shorter period than other and larger species.

Pipit (pip'it), or TITLARK (*Anthus*), a genus of perching birds possessing striking affinities with the larks, which they resemble in the large size of the hinder claw, but commonly classed with the wagtails, which they closely resemble in their habits of running swiftly on the ground. The meadow pipit or titlark (*Anthus pratensis*) is the commonest British species. The shore pipit, or rock lark (*A. petrōsus*), frequents the sea-beach, and feeds on molluscs and crustacea. The tree pipit or titlark (*Anthus arborĕus*) is a summer visitant only in the British Isles. All the pipits build their nests on the ground. The song in all consists of a clear, simple note. The *Anthus ludovi-*

cianus, 6 to 7 inches long, is common in North America.

Pippin (pip′in), the name given to a certain class of dessert apples, probably because the trees were raised from the pips or seeds, and bore the apples which gave them celebrity without grafting. The Ribston, Golden, and Newton pippins are favorite varieties, well known in the United States.

Pippin. See *Pepin*.

Pipra (pip′ra), a genus of passerine birds which inhabit South America. See *Manakin*.

Piqua (pik′wȧ), a city of Miami county, Ohio, on Miami River, and Miami and Erie Canal, 90 miles northeast of Cincinnati. It has manufactures of flour, shafts, furniture, sheet-steel and tin-plate, corrugated iron, straw board, etc. Pop. 13,388.

Piquet (pi-ket′), a game at cards played between two persons with thirty-two cards, all the plain cards below seven being thrown aside. In playing, the cards rank in order as follows: the ace (which counts eleven), the king, queen, and knave (each of which counts ten), and the plain cards, each of which counts according to the number of its pips. The player who first reaches 100 has the game. The score is made up by reckoning in the following manner: — Carte blanche, the point, the sequence, the quatorze, the cards, and the capot. Carte blanche is a hand of twelve plain cards, and counts ten for the player who holds it. The point is the suit of highest value, the value being determined by the number it makes up when the cards held are added together. The sequence is composed of a regular succession of cards in one suit. The quatorze is composed of four aces, four kings, four queens, four knaves, or four tens, and counts fourteen. The winner of the greatest number of tricks counts ten in addition (the 'cards'); if he holds all the tricks he counts forty in addition (the 'capot'). If a player scores twenty-nine in hand and one for the card he leads, before his opponent counts anything, he at once adds thirty to his score; this is called 'pique.' Should a player score thirty by the cards in his hand, by scores that reckon in order before his adversary can count, he obtains the 'repique,' which enables him to add sixty to his score. The scores are recorded according to the following table of precedence: 1, carte blanche; 2, point; 3, sequences; 4, quatorzes and trios; 5, points made in play; and 6, the cards. If one player scores a hundred before the other obtains fifty he wins a double.

Piqué-work (pē-kā′), a fine kind of inlaid work, resembling buhl-work (which see), but much more expensive and elaborate, the inlay being minute pieces of gold, silver, and other costly materials.

Piracy (pī′ra-si), those acts of robbery and depredation upon the high seas, or other places where the admiralty has jurisdiction, which, if committed upon land, would have amounted to felony only. This is substantially the definition of this offense by the law of the nations, which, on conviction, is punished with death in the United States, and generally in other civilized countries. It is an offense against the universal law of society, a pirate being, according to Coke, *hostis humani generis*. Piracy in the common sense of the word is distinguished from privateering by the circumstance that the pirate sails without any commission, and under no national flag, and attacks the subjects of all nations alike; the privateer acts under a commission from a belligerent power, which authorizes him to attack, plunder, and destroy the vessels which he may encounter belonging to the hostile state. Piracy has existed from a very early period, being considered a reputable pursuit by the ancient Greeks and Phœnicians. It continued until the last century, when it was commonly practiced by the Algerians and other north African sea-rovers. It now exists only in Chinese and Malayan waters.

Piræus (pi-rē′us; Greek, *Peiraieus*), the principal port of both ancient and modern Athens, is situated about 5 miles from that city, on a peninsula. It has three harbors: two on the east side, anciently named Zea (now Stratiotiki) and Munychia (now Phanari), and one on the west side, called simply Piræus, or the Harbor, the largest of the three. The Piræus was anciently connected with Athens by walls known as the Long Walls. When Greece was liberated from Turkish rule the Piræus was merely a scene of ruins. Since then a flourishing industrial and trading town has grown up, which is connected with Athens by a railway. Pop. 42,167.

Pirai, or PIRAYA (pi-rā′ya), the *Serrasalmo Piraya*, a voracious fresh-water fish of tropical America. It is 3 or 4 feet in length, and its jaws are armed with sharp, lancet-shaped teeth, from which cattle when fording rivers sometimes suffer terribly.

Piranesi (pē-ra-nā′sē), GIOVANNI BATTISTA, an Italian archi-

tect, engraver, and antiquary, was born at Venice in 1720, but passed the greater part of his life at Rome. His chief work, the *Antiquities of Rome*, was in 29 vols., with about 2000 copper plates giving views of Rome and its buildings. His representations are not always faithful, on account of the scope which he gave to his imagination. He died in 1778.

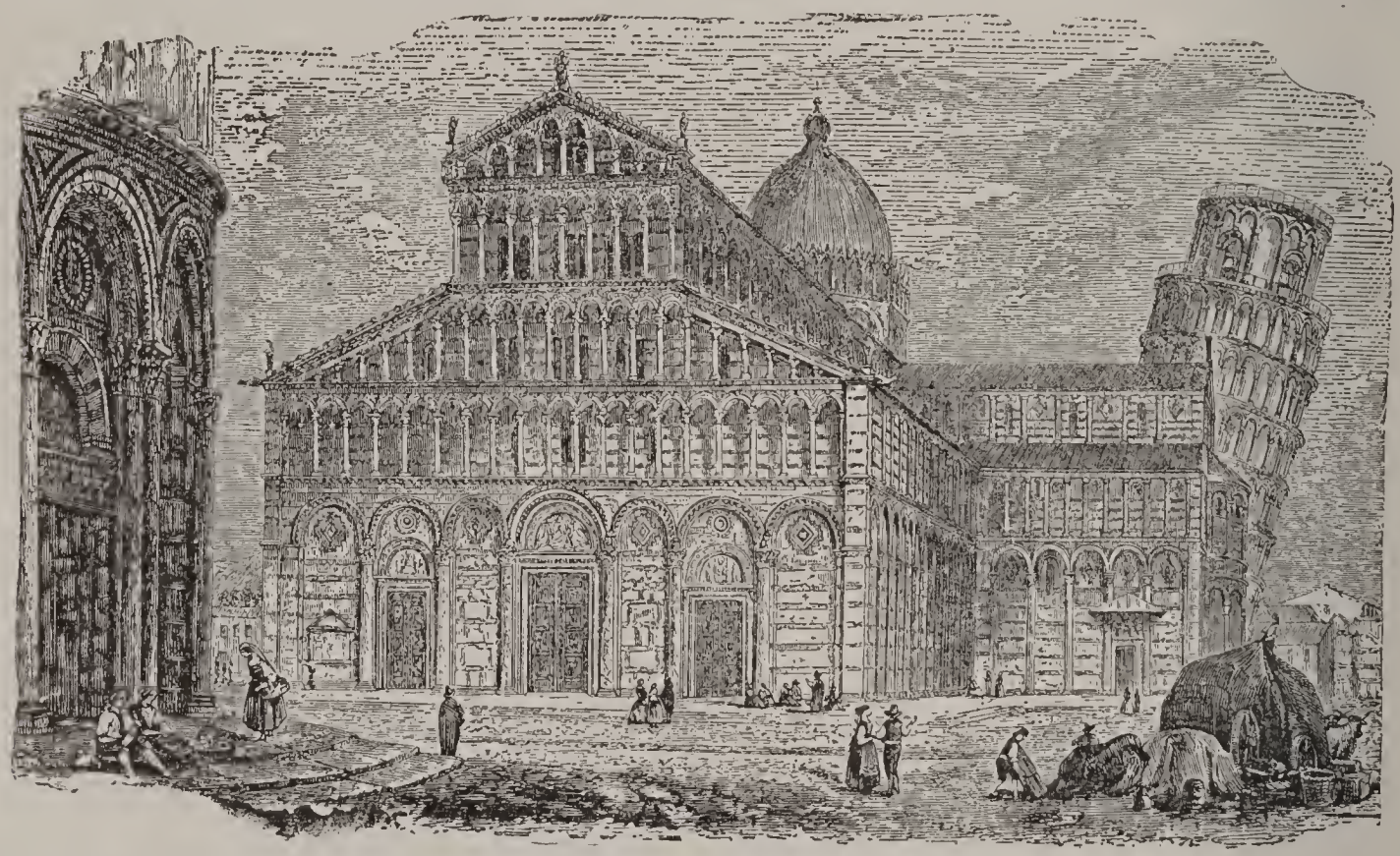
Pirano (pē-rä′nō), an Austrian seaport in Istria, near the head of the Adriatic, 13 miles southwest of Trieste. There is good anchorage for the largest vessels in the well-sheltered roadstead. The principal objects of commerce are wine and olive-oil. Pop. 13,339.

Pirmasens (pėr′mä-sens), a town of Bavaria, in the Palatinate, 22 miles w. s. w. of Landau. It is well built, has a good town-house and manufactures of shoes, musical instruments, leather, machinery, etc. Pop. (1905) 34,002.

Pirna (pėr′nä), a town of Saxony, 10 miles from Dresden, on the right bank of the Elbe. It has manufactures of stoneware, chemicals, cigars, beer, etc., and a considerable trade on the Elbe. Pop. (1905) 19,220.

Piron (pē-roṇ), Alexis, a French wit, poet, and dramatist, born at Dijon in 1689. He studied law at Besançon; but having gone to Paris he wrote for the Theater of the Comic Opera, and his first piece was *Arléquin Deucalion*, composed in two days. His success induced him to persevere, and after writing several pieces, he produced in 1738 his *chef-d'œuvre*, *Métromanie*, a comedy which Laharpe characterizes as excelling in plot, style, humor, and vivacity almost every other composition of the kind. Piron afterwards wrote *Fernand Cortes*, a tragic drama, and some other pieces, which obtained some success. He died in 1773.

Pisa (pē′zȧ; the ancient *Pisæ*), a town of Northern Italy, capital of the province of the same name, 6 miles from the Mediterranean, and 44 miles west of Florence, on both banks of the Arno, here crossed by three stone bridges for general traffic, and one carrying the railway. It is surrounded by walls and ditches, and defended by a citadel, the fortified circuit having a length of nearly 6 miles, much of the space inclosed being unoccupied. The river is lined by handsome quays on both sides (known as the Lungarno); the streets are spacious and well paved; and the houses are remarkable for the profusion with which marble has been employed in their construction. In the northwestern part of the city is a remarkable group of buildings consisting of the Duomo or Cathedral, the Baptistery, the famous 'Leaning Tower,' and the Campo Santo. The Cathedral, begun in 1063, conse-



Baptistery, Cathedral, and Campanile, Pisa.

crated in 1118, is one of the noblest ecclesiastical structures of Italy, built of marble, in the form of a basilica, with a rich façade and a dome of peculiar shape; the Baptistery, begun in 1153 and finished in 1278, is a large rotunda, adorned externally by a series of arcades with decorated canopies, and crowned by a dome of peculiar design, 190 feet high; the Campanile, or 'Leaning Tower,' is of cylindrical shape, built of white marble, and has the whole exterior enriched by a succession of arcades extending from base to summit: its height is 179 feet, and it deviates 13 feet from the perpendicular. The Campo Santo, or cemetery, is the most remarkable structure of the kind in existence, consisting of a court surrounded by arcades of white marble, adorned with sculptures and frescoes, by the earlier Italian masters, and full of remarkable monuments. Other edifices are the town-house (Palazzo del Commune); the courthouse (Palazzo Pretorio); and the university, anciently famous, and still one of the most celebrated in Italy. The manufactures consist chiefly of silk, woolen, and cotton goods. The population, which reached 150,000 when the city was in its zenith, is now only 61,279. The province of Pisa has an area of 1180 square miles, and a population of 320,829.— Pisa was an ancient Etrurian city, and one of the twelve cities of the confederation. In 180 B.C. it became a Roman colony. About the beginning of the Christian era it was a flourishing city. On the fall of the Roman Empire it was pillaged by the Goths, and afterwards subjected by the Longobards. In the tenth century it had succeeded in taking a lead among the Italian states; but, after protracted and unsuccessful wars with Genoa at the end of the thirteenth, and with Florence at the end of the fifteenth century, it was finally compelled by famine to submit to the Florentines (June 8, 1509), and thus ceased to be independent. On the ruins of Pisa was founded the power of the Grand-duchy of Tuscany.

Pisa, Council of, a special council of the Roman Catholic Church, held to consider the pretensions of the rival popes of Avignon and of Rome, opened March 25, 1409. The rival popes, Benedict XIII (of Avignon) and Gregory XII (of Rome) were summoned to appear within a stated period, but refused to comply. After mature deliberation both popes were formally deposed, and Cardinal Pietro Philargi, Archbishop of Milan, was elected. The authority of the council was not, however, generally recognized, and it was not until 1417 that the schism can be said to have terminated.

Pisano (pē-sä'nō), Niccolo, an Italian sculptor and architect, born at Pisa about 1205 and spent the most of his life there; died in 1278. He holds an important place in the history of Italian art, inasmuch as his works presented a sudden and new development and far surpassed those of his immediate predecessors. Among his famous works are the reliefs of the baptistery of Pisa, the choir of the cathedral of Siena, and the beautiful sarcophagus of St. Dominic in Bologna. His chief architectural works are churches in Pisa, Pistoja, and Volterra.

Pisces, or Fishes. See *Ichthyology.*

Pisces (pis'ēz; the Fishes), a sign of the zodiac, which is entered by the sun about the 19th of February. The constellation which occupies the zodiacal region corresponding to the sign has the same name; it contains some interesting double stars.

Pisciculture (pis'i-kul-tūr), the breeding, rearing, preservation, feeding, and fattening of fish by artificial means. Pisciculture has been practiced from very remote ages, having been in use in ancient Egypt, and followed in China in early times on a very large scale. The art, so far as the perfecting of natural conditions under which fish live and thrive, without interfering directly with the ordinary processes of nature, has thus always been more or less practiced. But the recent discovery that the ova of fish can be taken from the body of the female parent, impregnated with the male milt and hatched in tanks, has led to a great extension of the art. One great point in modern pisciculture is the propagation and rearing of young fish in artificial ponds with the view of introducing fish into some locality where they were not previously found. The art has now come into general favor and is widely followed, very many rivers having on their banks breeding and rearing establishments for the purpose of increasing the stock of fish in the streams. The American Fish Commission has successfully introduced into various waters the whitefish, the California trout, the brook char, the shad, and various other fishes, and pisciculture on a large scale is practiced both in the United States and Canada, as also in the leading countries of Europe. The artificial culture of oysters, mussels, lobsters, and other crustacea, is also receiving its due share of attention; so

that altogether the art is every year attaining a greater development, and promises to become an important department of commercial industry. Many millions of young fish are planted yearly, and as a result the evils of over-fishing have been in considerable measure obviated.

Piscidia (pis-sid′i-a), a genus of plants, nat. order Leguminosæ, the species being West Indian trees. The bark of the root of *P. Erythrina* (dogwood tree) is a powerful narcotic, and is used as a substitute for opium, and also for poisoning fish. The timber makes excellent piles for docks and wharfs, being heavy, resinous, and almost imperishable.

Piscina (pi-sī′na), a niche, generally on the south side of the altar in churches, containing or having attached a stone basin or trough, with a channel leading to the ground. It is used to hold the water in which the priest washes his hands, and for rinsing the chalice.

Pise (pē′sā), material for forming the walls of cottages, agricultural buildings, etc., consisting of stiff clayey materials usually mixed with gravel well rammed into a frame, and when dry forming a good strong wall. These walls are thicker at bottom than at top. They must not be built too rapidly.

Pisek (pē-sek′), a town of Bohemia, on the right bank of the Wottawa, 52 miles south by west of Prague. It is surrounded by an old and lofty wall, flanked with numerous towers; is well built, and contains the remains of a royal castle. Pop. 13,608.

Pisidia (pi-sid′i-a), in ancient geography, a province of Asia Minor, situated between Phrygia, Cilicia, Pamphylia, Lycia, and Caria. The inhabitants were mountaineers, and were never really subdued by the Romans, being protected by the mountains and ravines which intersect the country.

Pisistratus (pī-sis′trȧ-tus; Greek, *Peisistratos*), 'tyrant' of Athens, was descended from Codrus, the last king of Athens, and was born not later than 612 B.C. He was rich, handsome, and eloquent, and being by nature ambitious he soon placed himself at the head of one of the three parties into which Attica was then divided. By putting himself forward as the patron and benefactor of the poor, and by advocating civil equality and a democratic constitution, he was able (notwithstanding the opposition of Solon) to seize upon the acropolis (citadel) in 560 B.C., and thus to make himself master, or, as the Greeks termed it, 'tyrant' of the city. But though a tyrant in the Greek sense, his use of power was by no means tyrannical. He made no attempt to abolish the wise laws of Solon, but confirmed and extended their authority. He was, however, twice driven from Athens; but in the eleventh year of his second banishment succeeded in making himself master of the sovereignty for the third time. Pisistratus erected splendid public buildings at Athens, established a public library, and collected and arranged the poems of Homer, and conducted himself with so much prudence and clemency that his country scarcely ever enjoyed a longer term of peace and prosperity. He died 527 B.C., leaving two sons, Hippias and Hipparchus, to inherit his power. They were not, however, able to preserve it. See *Hippias*.

Pi′solite. See *Peastone*.

Pistachio (pis-tā′shi-o), a tree of several species, of the genus *Pistacia*, nat. order Anacardiaceæ, growing to the height of 15 to 20 feet. *P. vera* yields the well-known pistachio-nut, which contains a kernel of a pleasant taste, resembling that of the almond, wholesome and nutritive, yielding a pleasant oil. It is a native of Western Asia, but is much cultivated in the south of Europe. The gum named mastic is obtained from *P. lentiscus*, as well as from *P. Atlantica*. See *Mastic*.

Pistachio (*Pistacia vera*).

Pistil (pis′til), in botany, the female or central seed-bearing organ of a phanerogamous

Pistil.
a, style; *b*, stigma.

flower, consisting of one or more *carpels* or modified leaves. There may be only a single pistil or several in the same flower. It consists essentially of two parts, the *ovary*, containing the ovules or young seeds, and the *stigma*, a cellular secreting body which is either seated immediately on the ovary (as in the tulip and poppy), and is then called *sessile*, or is borne on a stalk called a *style* interposed between the ovary and stigma. It is on the stigma that the pollen falls by which fecundation takes place, after which the ovule develops into the seed. See *Placenta, Botany.*

Pistil of Tobacco.

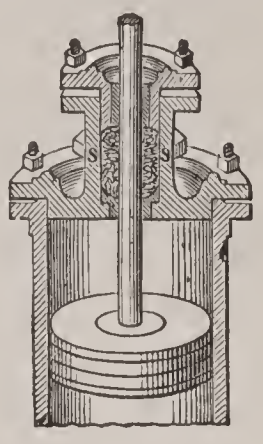
Pistillidium (pis-til-id'i-um), an organ of cryptogamic plants, which seems to have functions analogous to those of the pistil of of a phanerogamous flower. It is the young spore-case.

Pistoja (pis-tō'yȧ; ancient *Pistoria*), a town of Italy, in the province of Florence, and 20 miles northwest of the city of that name, near the left bank of the Ombrone. It is surrounded by lofty walls, contains a Romanesque cathedral (twelfth to thirteenth century) and other notable churches and buildings, and has manufactures of iron and steel goods, firearms, linen, etc. Pistols were first made here, and received their name from the town. Pop. (1906) 27,127.

Pistol (pis'tul), a small firearm with a curved stock, discharged with one hand, named from the town of Pistoja, where it was first made. Pistols were introduced into England in 1521. Mention is made of their use in 1544. The 'dag' mentioned by the Elizabethan writers was a kind of clumsy pistol. Pistols are made of various sizes, ranging from 6 inches (the saloon and pocket pistol) to 18 and even 24 inches (the holster pistol). They have been remarkably developed in effectiveness, and the modern pistol is a formidable weapon in close-hand fighting. See *Revolver.*

Pistole (pis-tōl'), a gold coin met with in several parts of Europe, more especially in Spain, value about $4.00, but not now coined. It was originally a Spanish coin, and was equivalent to a quarter of a doubloon.

Piston (pis'tun), in machinery, a movable piece, generally of a cylindrical form, so fitted as to occupy the sectional area of a tube, such as the barrel of a pump or the cylinder of a steam-engine, and capable of being driven alternately in two directions by pressure on either of its sides. One of its sides is fitted to a rod, called the *piston-rod*, which it either moves backwards and forwards, as in the steam-engine, where the motion given to the piston-rod is communicated to the machinery; or the piston is itself made to move by the rod, as in the pump. The piston is usually made to fit tightly by some kind of material used as *packing*, the piston-rod being also made similarly tight by material closely packed in the *stuffing-box* (*s s*).



Piston and Cylinder.

Pit, in horticulture, the name applied to an excavation below the surface of the soil, generally covered by a glazed frame for protecting plants.

Pita Hemp (pē'ta), a name given to the fiber of the agave or American aloe. See *Aloe.*

Pitaval (pit-a-val), François Gayot de, a French jurist-consult and miscellaneous writer, born at Lyons in 1673; died in 1763. He was successively abbé, soldier, lawyer, and man of letters. The most important and best known of his works is a collection of criminal trials — *Causes Célèbres et Intéressantes* (1734–43, twenty vols.).

Pitcairn Island (pit'kârn), an island in the South Pacific, belonging to the Low Archipelago, lat. 25° 5′ s.; lon. 130° 5′ w.; length, 2¼ miles; breadth, about 1 mile. It was discovered by Carteret in 1767. Its coast is almost perpendicular throughout its whole extent, fringed with formidable rocks and reefs, accessible only at two points, and not at all in stormy weather. It rises to the height of 1100 feet, and the soil, naturally fertile, yields good pasture, potatoes, yams, plantain and bread-fruit, pineapples, and other tropical fruits. The island is chiefly remarkable as the home of the descendants of the *Bounty* mutineers, nine of whom, together with six men and twelve women, natives of Tahiti, landed here in 1790. Violent dissensions soon arose and at the end of ten years the only survivors were John Adams, an Englishman (whose real name was said to have been Alexander Smith), the females, and nineteen children. They were found in 1808 by the American, Captain Folger, who reported the dis-

covery to the British government. The interest thus aroused soon brought other visitors to the island, all of whom dilated with enthusiasm on the virtuous, sober, and industrious life led by the inhabitants. They became, however, too numerous to subsist comfortably on this small island, and they were transferred, to the number of 194, to Norfolk Island in 1856, but about 40 soon returned. In 1881 the inhabitants numbered 96, and in 1900, 130. Whalers and trading vessels occasionally call and exchange the products of civilization for the produce of the island. See *Norfolk Island.*

Pitch (pich), the residuum obtained by boiling tar till the volatile matter is driven off. It is extensively used for caulking the seams of ships, for preserving wood and ironwork from the effects of water, for making artificial asphalt, etc.

Pitch, the acuteness or gravity of any particular musical sound, which is determined by the number of air-vibrations in a given time — the greater the number, the higher the note. In stringed instruments the pitch is dependent on the length, thickness, and degree of tension of the string; in wind instruments, such as the flute or organ, chiefly on the length of the column of air set in motion. (See *Music.*) The tuning-fork is in common use to assist in giving some desired pitch.

Pitchblende, a mineral chiefly found in Saxony and Cornwall, composed of 86.5 oxide of uranium, 2.5 black oxide of iron, galena, and silex. In color it varies from brown to black, and occurs globular, reniform, massive, disseminated, and pulverulent. Specific gravity, 7.5. It generally accompanies uranite and is the chief source of the newly discovered element, radium.

Pitcher Plant (pich'ėr), a name given to several plants from their pitcher-shaped leaves, the best known of which is the *Nepenthes distillatoria*, a native of China and the East Indies, and belonging to the natural order Nepenthaceæ. It is a herbaceous perennial, and grows in marshy situations. The leaves are sessile, oblong, and terminated at the extremities by a cylindrical hollow vessel resembling a common water-pitcher, which contains a fluid secreted by the plant itself. The pitcher is furnished with a lid which generally opens in the day and shuts at night, and which is regarded as the true blade of the leaf. Wonderful curative powers are ascribed to the fluid in the pitcher and to the leaf and the root of this plant, by the natives of the East Indies and Madagascar. There are numerous other pitcher-plants, varying in shape and the proportions of their parts, and found in all parts of the world.

Pitcher-plant (*Nepenthes distillatoria*).

Pitch-pine. See *Pine.*

Pitchstone, a black, glossy, pitch-like volcanic rock. It is found chiefly in the Hebrides, Southern Europe, South America, and Mexico, in veins and in dykes or bosses, sometimes forming whole mountains. Specific gravity, 2.29–2.64.

Pitchurim-beans (pich'u-rim), the name given to the lobes of the drupe of *Nectandra puchury*, a South American species of laurel, used by chocolate makers as a substitute for vanilla.

Pith, the cylindrical or angular column of cellular tissue at or near the center of the stem of a plant, also called the *medulla.* It is not usually continued into the root, but is always directly connected with the terminal bud of the stem.

Pithecanthropus Erectus (pith-e-kan-thrō'pus), the name given to the fossil remains of an animal found in Java in 1891. It is apparently higher than the ape and lower than man and is looked upon by many as one of the 'missing links' in human development. Whether it shall be considered man or ape is yet in doubt. The portion of a cranium found is midway in size and form between those of man and the gorilla, and the femur is like that of man.

Pitman (pit'man), Benn, brother of Sir Isaac Pitman, born at Trowbridge, England, in 1822. He lectured on phonography in England from 1843–52. He afterwards settled in Cincinnati, Ohio. He was a government reporter of state trials, 1862-65, and became an instructor in the University of Cincinnati in 1873. He published various text-books of phonography. He died in 1910.

Pitman, Sir Isaac, born at Trowbridge, England, in 1813; died in 1897. He was the inventor of the modern system of phonographic shorthand writing, also of one of the best systems of phonotypy. He published a number of works devoted to the science of shorthand.

Piton-bark, same as *Caribbee-bark.*

Pitt, Earl of Chatham. See *Chatham (William Pitt, Earl of).*

Pitt, WILLIAM, second son of the Earl of Chatham, born in 1759; died in 1806. He possessed a remarkably precocious intellect, but his physical powers were weak. He was educated privately till his fourteenth year, when he entered Cambridge. He was called to the bar in 1780, and entered parliament the following year as member for Appleby. His success in the house was of unparalleled rapidity. He supported Burke's financial reform bill, and spoke in favor of parliamentary reform; became chancellor of the exchequer at twenty-three, under the Earl of Shelburne, and in the following year attained the position of prime minister. Although

William Pitt.— From the statue by Chantrey.

strongly supported by the sovereign, he stood opposed to a large majority of the House of Commons, and a dissolution took place in March, 1786. At the general election which followed the voice of the nation appeared decidedly in his favor, and some of the strongest aristocratical interests in the country were defeated, Pitt himself being returned by the University of Cambridge. His first measure was the passing of his India Bill, establishing the board of control, which was followed by much of that fiscal and financial regulation that gave so much *éclat* to the early period of his administration. The establishment of the delusive scheme of a sinking fund followed in 1786, and his Regency Bill in 1788. The French revolution now broke out, and in 1793 war arose between Great Britain and France, a conflict which brought a heavy responsibility on Pitt, and immense sacrifices and burdens on his country. In 1800 the Irish union was accomplished. In 1801 the opposition of the king to all further concession to the Irish Catholics caused Pitt to resign his post. The Peace of Amiens succeeded, and Pitt for a time supported the Addington administration which concluded it, but afterwards joined the opposition. The new minister, who had renewed the war, unable to maintain his ground, resigned; and in 1804 Pitt resumed his post at the treasury. Returning to power as a war minister, he exerted all the energy of his character to render the contest successful, and found means to engage the two great military powers of Russia and Austria in a new coalition, which was dissolved by the battle of Austerlitz. This event he did not survive long; for his constitution, weakened by persisent gout, rapidly yielded to the joint attack of disease and anxiety. Biographers naturally differ as to his merits as a statesman; some assign him a most exalted place, while others represent him as entirely destitute of great ideas, as a man of expedients instead of principles, as a lover of place and royal favor. It is, however, universally granted that he was a distinguished orator, even amongst the very eminent speakers of that period, and that he was a man of strict personal honor. A public funeral was decreed to his honor by parliament, and a grant of £40,000 to pay his debts.

Pitta. See *Ant-thrush.*

Pittacus (pit'a-kus), one of the so-called seven wise men of Greece, born about B.C. 652; died 569, at Mitylene, on the island of Lesbos. He was highly celebrated as a warrior, a statesman, a philosopher, and a poet. In 589 the citizens raised him to the dictatorship, an office which he filled for ten years.

Pittsburg (pitz'burg), a city of Crawford county, Kansas, on the Atchison, Topeka and Santa Fé, and other railroads. It has railroad shops, extensive zinc and iron industries, manufactures of sewer-pipe, etc. Coal is largely mined here. Pop. 14,755.

Pittsburgh, a city, capital of Allegheny county, Pennsylvania, in the angle between the Monongahela and the Allegheny rivers where they unite to form the Ohio, 260 miles W. by N. of Philadelphia, and on the Pennsylvania, the Baltimore and Ohio, and other railroads. It is admirably situated for trade, having ample river and railway connection with the great com-

mercial emporiums of the East, West, and South, while in the neighborhood there are immense and cheaply-obtainable coal supplies. These exceptional advantages have made Pittsburgh the chief center of the American iron and steel industry; smelting furnaces, foundries, rolling-mills, etc., being numerous and on a very large scale. The pig-iron product is about one-fourth of that of the whole country and the steel product more than one-half. The glass manufactures of Pittsburgh also rank first in importance in the United States; cotton goods, leather, earthenware, white lead, soda, tobacco, beer, and spirits are largely produced; but the chief products are iron and steel, hardware and machinery, electrical appliances, railroad brakes, cars and locomotives, steel bridges, aluminum, glass, coal, and coke. In addition to coal, this city is the center of an extensive petroleum and natural gas field. Pittsburgh consists of the town proper and of several large suburbs, and with those that are on the opposite side of the rivers the connection is kept up by numerous bridges, comprising some very excellent examples on the suspension principle. Of the adjacent places, which, though separately incorporated, were long regarded as suburbs of Pittsburgh, the most important is Allegheny, on the right bank of the Allegheny River, a favorite residence with the wealthier classes. It has now become a corporate part of Pittsburgh and the combined cities possess many fine public buildings and institutions. Among these may be named the Carnegie Library and Institute building (with a large library, music-hall, art gallery and natural history museum), the amply-endowed Carnegie Schools of Technology, the Phipps Conservatory, the United States Arsenal, the Western University of Pennsylvania, the Pennsylvania College for Women, the Exposition buildings, the Roman Catholic and St. Paul's cathedrals, various municipal buildings and charitable institutions, etc. Pittsburgh occupies the site of a fort called Du Quesne, which was built by the French in 1754. It was afterwards captured by the British, in 1758, and named in honor of William Pitt. Allegheny was joined to it by act of the legislature, sustained by a decision of the United States Supreme Court, in 1907. Its population in 1900 was 321,616; that of Allegheny 129,896; making 451,512. In 1910 the population of the consolidated city was 533,905.

Pittsfield (pitz′fēld), a city, capital of Berkshire county, Massachusetts, on the Housatonic River, 151 miles W. of Boston. It is situated in the Berkshire Valley, 1010 feet above sea-level, and is surrounded by mountains. It has large manufactures of cotton and woolen goods, knit goods, shoes, paper, machinery, etc. There are a number of interesting institutions, among them the white marble courthouse and the Berkshire Athenæum, which stand in the public green in the center of the city, and are known as the 'Heart of Berkshire.' Pop. 32,121.

Pittston (pitz′tun), a city of Luzerne Co., Pennsylvania, on the Susquehanna River, in the Wyoming Valley, 9 miles N.E. of Wilkes-Barre. Here are extensive anthracite-coal industries, planing, knitting, paper, and silk mills, iron and terra-cotta works, breweries, etc. The St. John's Academy is located here. Pittston is the business center of a populous surrounding district. Pop. 16,267.

Pituitary Body (pi-tū′i-ta-ri), a rounded body of the size of a small bean found in the *sella turcica*, a saddle-shaped cavity of the sphenoid bone in the floor of the cavity of the skull. Its function is to stimulate the thyroid and adrenal glands.

Pityriasis (pit-i-rī′a-sis), a chronic and non-contagious inflammation of the skin, manifesting itself in red spots or patches on which minute scales are produced, thrown off as soon as formed, and as quickly renewed. It may affect any part, and, though seldom, many parts of the body at the same time; but the commonest is the *P. capitis*, on the head, when the scales are popularly known as scurf or dandruff. Mild forms generally yield to warm bathing and a light diet, if persevered in; but more obstinate cases can only be thoroughly cured by a radical change in the system, produced by suitable regimen and treatment.

Piura (pē-ö′rȧ), a town of Northern Peru, capital of province of same name, connected by railway with its port, Payta. Pop. about 12,000.

Pius II (pī′us; ÆNEAS SYLVIUS PICCOLOMINI), pope, born in 1405; died in 1464. He was descended from an illustrious Tuscan family, and studied at the University of Siena. He became secretary to Cardinal Capranica, and the Council of Basel in 1431; to the anti-pope Felix V in 1439, and to Frederick III of Germany in 1442. The emperor sent him as an imperial ambassador to a diet at Ratisbon, and in 1446 to Pope Eugenius IV to negotiate the submission of Germany. He gained the favor of Eugenius, whom he had formerly

opposed, and by his successor was created bishop of Trieste in 1447, and cardinal in 1456. He succeeded Calixtus III as pontiff in 1458. In 1460 he published a bull condemning the doctrine he had in former years so vigorously defended: the superiority of a general council to the pope. Pius II was one of the most learned men of his age, and left some valuable and interesting historical works, orations, and letters.

Pius V (Michele Ghisleri), pope, born in 1504; died in 1572. He was raised to the cardinalate by Paul IV in 1557, appointed inquisitor in Lombardy, then inquisitor-general, and chosen pope in 1565. He chiefly distinguished himself by his zeal for conversion of Protestants and Jews; the bull in *Cœna Domini* was renewed by him, and the authority of the *Index Expurgatorius* enforced. In 1570 he excommunicated Elizabeth of England. He lent his influence and assistance to Charles IX of France against his Protestant subjects, and to the Venetians and Spaniards in their war against the Turks. He was canonized by Clement XI.

Pius VI (Giovanni Angelo Braschi), pope, born at Cesena in 1717; died at Valence in 1799. He held important offices under several pontiffs, was raised to the cardinalate by Clement XIV and succeeded him in 1775. Several beneficent reforms were introduced by him in the finance department; he also improved the Vatican Museum, drained the Pontine marshes, reconstructed the port of Ancona, and embellished Rome. The French revolution, however, hastened the decay of the temporal power of the holy see. In 1791 Avignon and the county of Venaissin were reunited to France; by the treaty of Tolentino (1797) he lost the Romagna, Bologna, and Ferrara; and on the 15th of February, 1798, General Berthier established the Roman republic, deprived the pope of his authority, and conveyed him as a prisoner to France, where he died the following year.

Pius VII (Gregorio Barnaba Chiaramonti), pope, born at Cesena in 1742; died in 1823. At the age of sixteen he was received into the order of Benedictines, served as teacher in several abbeys, and subsequently became professor of philosophy in Parma, and of theology in Rome. Pius VI created him bishop of Tivoli, cardinal and bishop of Imola; and his friendly attitude towards the Cisalpine Republic secured him the favor of France, and the election to the papal chair in 1800. After his accession he aimed at re-establishing the old order of things, and to gain it he tried to conciliate Napoleon by attending his coronation. He aroused the open enmity of the emperor by refusing to be present at the coronation in Milan, and to recognize his brother Joseph as king of Naples; the results being another occupation of Rome by French troops (February 2, 1808), the incorporation of the papal cities, and shortly after of Rome itself, with the Kingdom of Italy, and the arrest of the pope (July 6, 1809) and his confinement in Savona and afterwards at Fontainebleau. In 1814 he was released and restored to the possession of all the papal territories except Avignon and Venaissin in France, and a narrow strip of land beyond the Po. His subsequent government was politically and ecclesiastically of a reactionary character.

Pius IX (Giovanni Maria Mastaï Ferretti), pope, born in 1792, was destined for a military career, and on the restoration of Pius VII entered the Guardia Nobile of the Vatican, but soon after adopted the clerical profession. He held various ecclesiastical offices under Leo XII, who appointed him Archbishop of Spoleto in 1827, and to the see of Imola in 1832. Here he acquired much popularity by his liberal tendencies. He further showed his benevolent nature during a mission to Naples at the time of a cholera epidemic, when he sold his plate, furniture, and equipage to relieve the sufferers. Although raised to the cardinalate in 1840, he resided in his diocese until his election to the pontificate in 1846. His accession was signalized by the release of 2000 political prisoners, followed by a complete amnesty; and Italy was to be free and independent under a liberal constitution. But the Italians, who wanted to be free of the Austrians, flocked under the banner of Charles Albert, and Pio Nono, as pontiff, found himself obliged to interfere. Disaster, bloodshed, and anarchy followed, and he had himself to seek safety in flight. A Roman republic was proclaimed (Feb., 1849), with Mazzini at its head. Louis Napoleon, president of the French republic, sent an expedition to Rome, which defeated the Italian patriots under Garibaldi, and occupied the city (July 3). The pope returned in April, 1850, but he left the direction of state affairs principally in the hands of his secretary of state, Cardinal Antonelli. On the death of that distinguished prelate, Pio Nono again bestowed his whole attention on the church. He recalled the Jesuits, canonized saints, countenanced miracles, and

defined new dogmas. The immaculate conception of the Virgin was settled by a papal decree in 1854, and the dogma of papal infallibility was established by the ecumenical council of 1870. By this time the pope's dominions had been greatly reduced, and what remained of the temporal power was secured by the presence of French troops at Rome. But the downfall of Napoleon III caused their withdrawal; the Italian troops took possession, and the political rule of the holy see was at an end. The Vatican was left to the pope, and his independence insured. Free diplomatic intercourse, the honors due to a sovereign, and a civil list of $645,000 yearly, were secured to him. But these he declined, and year after year he confined himself to the Vatican and its garden, declaring that he was under restraint, and a prisoner in his own palace. His death took place in February, 1878.

Pius X (Giuseppe Sarto), pope, was born of humble parents at Riese, near Venice, in 1835. He studied at Treviso and Padua and was ordained priest in 1858, being soon after made chancellor of the diocese and vicar of the chapter of Treviso. Leo XIII appointed him bishop of Mantua in 1884, and cardinal and patriarch of Venice in 1893. The papal nomination to this office was for a time disputed by the Italian government, which claimed the right to nomination. But the new patriarch's simplicity of life, vigorous repression of abuses, and sympathy with the poor endeared him to the people, and on the death of Leo XIII in 1903 he was a prominent candidate for the papacy. He was elected in August, 1903, after six fruitless ballots had been taken. As a pope he has distinguished himself rather for piety and administrative activity than for learning. His term of service has been one of opposition to the authority and power of the Church, France, Spain, and Portugal alike passing repressive edicts against the powers and influence of the clergy. These innovations Pius has vigorously resisted, though he has been unable to prevent or modify them.

Piute, or Paiute (pī-ūt′) Indians, the name of a small tribe of southwestern Utah, but generally given to a number of tribes of Utah, Nevada, Arizona and southeast California. The number is about 5000 in all.

Pizarro (pē-zar′ō), Francisco, a Spanish adventurer, the discoverer and conqueror of Peru, was born in 1471, the illegitimate son of a hidalgo, and was first a swineherd and then a soldier. The spirit of adventure which at that time pervaded Spain prompted him to seek fortune in the newly-found continent of America, where he participated in various military and trading expeditions. While resident near Panama he became associated with two other adventurers, Hernando Lugue, or de Lugues, and Diego de Almagro. In 1524 they jointly fitted out an expedition with a view to exploration and conquest, and on their second voyage discovered Peru; but finding their force inadequate for conquering the country, Pizarro returned to Spain for assistance. He arrived in Seville in 1528, was granted the necessary powers and a small force, and recrossed the Atlantic in 1531. The following year he arrived in Peru during a civil war, treacherously seized the person of the reigning inca at a friendly interview, and after extorting an immense ransom, put him to death. The whole empire was gradually conquered without much opposition, but its settlement was long in abeyance owing to a feud between Pizarro and Almagro. Hernando Pizarro, a brother of the general, strangled Almagro in 1537. This act was avenged in 1541, when a son of Almagro murdered Francisco Pizarro in his palace at Lima. Lima was founded by Pizarro in 1535, and his remains are interred in the cathedral of that city, also founded by him.

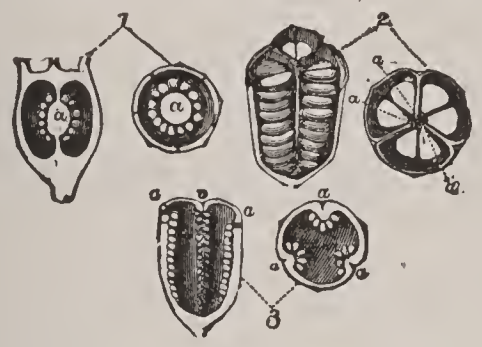
Pizarro, Gonzalo, half-brother of the preceding, was born in 1502. His brother appointed him governor of Quito in 1540, and after the assassination of Francisco, he raised an army against the new viceroy, Blasco Nuñez, and the latter was defeated and slain near Quito in 1546. But Pizarro did not long enjoy his success, being beaten, taken prisoner, and beheaded in 1548.

Placenta (pla-sen′ta), the structure which, in the higher Mammalia, connects the fœtus, or unborn embryo, with the circulation of the mother, thus providing for its due nutrition. In its most typical form it is only met with in the higher Mammalia, which are therefore called *placental* mammals, while the lower Mammalia are termed *implacental* or *aplacental*, from their wanting a placenta; the latter include only the two orders Monotremata and Marsupialia. Certain analogous structures also exist in connection with the development of the young of some species of sharks and dogfishes. The human placenta presents the most perfect type, and is a special growth on the part both of the womb and the ovum. By the end of pregnancy it forms a disk-like mass, measuring 7½

HIS HOLINESS POPE PIUS X
With Papal Crown and Robes of State.

inches across, ¾ inch thick, and about 20 oz. in weight. Connected with it near the middle is the umbilical cord, by means of which the growing embryo is attached to the placenta. Through the placenta and the umbilical cord the blood of the embryo comes into close communication with the blood of the mother, by means of which its purity and nourishing qualities are maintained, and the requisite supply of material furnished for the embryo's continued life and growth. At the end of pregnancy the placenta is thrown off as the after-birth, after the child itself has been expelled.

Placenta, in botany, a development of cellular tissue at the inner or ventral suture of a carpel, to which the ovules or seeds are attached either immediately or by umbilical cords, as in the pod of the pea. The placenta is formed on each margin of the carpel, and is therefore essentially double. When the pistil is formed by one carpel the inner margins unite in the axis, and usually



Transverse and Vertical Sections to show Placenta.

1, Central Placenta. 2, Axile central Placenta. 3, Parietal Placenta. *a a,* Placentæ.

form a common placenta. When the pistil is composed of several carpels there are generally separate placentas at each of their margins. The term *parietal placenta* is applied to one not projecting far inwards, or one essentially constituted of the wall of the seed-vessel. The form of placentation forms an important distinction between the various orders of plants.

Placentalia (pla-sen-tā'li-a), the placental mammals. See *Placenta.*

Placentia. See *Piacenza.*

Placentitis (pla-sen-tī'tis), inflammation of the placenta, a disease which occurs acute or chronic, more frequently the latter. It may result from a blow, fall, fright, sudden and violent emotion, and other serious shocks to the system. The fœtus is injuriously affected, and may be destroyed by it; abortion frequently results, and at almost any stage of pregnancy.

Placoid (plak'oid), a term used to designate a variety of scales covering the bodies of the Elasmobranchiate fishes (sharks, skates, rays, etc.), the *Placoidei* of Agassiz. These structures consist of detached bony grains, tubercles, or plates, of which the latter are not uncommonly armed with spines.

Plagal (plā'gal), in music, the name given by Gregory the Great to the four collateral scales which he added to the four authentic scales of Ambrose. (See *Gregorian Tones.*) The term plagal is now applied to melodies in which the principal notes lie between the fifth of the key and its octave. The plagal cadence consists of the chord of the subdominant followed by that of the tonic. See *Music.*

Plagiostomi (pla-gi-os'to-mi; Gr. *plagios,* oblique; *stoma,* mouth), a suborder of fishes of the order Elasmobranchii, distinguished by the bodies of the vertebræ being either bony or at any rate containing osseous elements; the skull gristly or cartilaginous; the mouth a transverse slit, situated on the under surface of the head; and the teeth numerous. The Plagiostomi include three groups: the Cestraphori, represented solely by the *Cestracion Phillipi* or Port-Jackson shark; the Selachii (sharks and dogfishes); and the Batides, represented by the skates, rays, and sawfishes.

Plagium (plā'ji-um), in the Roman law, is the crime of stealing the slave of another, or of kidnaping a free person in order to make him a slave. By Scotch law the crime of stealing an adult person (*plagii crimen*) was punishable with death, and the same punishment has been applied to the stealing of children.

Plague (plāg), a contagious and very fatal febrile disease characterized by entire prostration of strength, stupor, delirium, often nausea and vomiting, and certain local symptoms, as buboes, carbuncles, and livid spots (*petechiæ*). Like all other malignant fevers, the plague has its various stages, but most frequently runs its course in three days, although death may ensue a few hours after its appearance. If the patient survive the fifth day, he will, under judicious treatment, generally recover. There is no specific remedy against the disease, and a variety of treatment has been adopted on different occasions and by different medical men. The plague appeared in the most ancient times, although historians have used the terms indiscriminately for other epidemics. The first recorded visitation of the

plague to Europe is that at Athens (430 B.C.), described by Thucydides; Josephus relates that of Jerusalem, A.D. 72. Among the most disastrous plagues of antiquity are those of Rome in 262, when 5000 persons are said to have died daily; and of Constantinople in 544. From the latter part of the sixth to the twelfth century it ravaged at intervals various parts of Europe, particularly France and Germany. In the thirteenth century it was brought to modern Europe by the Crusaders, and from 1347 to 1350 it traversed all Europe, and was then called the *black death*. The scourge again claimed its victims in the succeeding centuries, and in 1593 it was brought to England by an army returning from the Continent. Before the true nature of the disease became known it had gained a firm footing in London, and there were 11,503 deaths. London lost by the plague 36,269 lives in 1603; 35,500 in 1625; 13,480 in 1636; and 68,600 in 1665. The plague in Marseilles in 1720 caused the death of over 60,000 in seven months, and in Messina (1743) of 43,000 in three months. In 1771 it nearly swept off the whole population of Moscow. Subsequently it appeared locally in Europe at a number of points. Its last appearance in Europe was in 1878–79, on the banks of the Lower Volga (Astrakhan and neighborhood). An epidemic of plague broke out in the Bombay Presidency, India, in 1896, and still continues, though with lessened virulence. Recent research has traced the disease to the effect of a micro-organism, and discovered that rats are subject to it and that fleas convey it from rats to men. On its recent appearance in San Francisco an active crusade against rats and squirrels in California went far to prevent its spread.

Plaice (plās; *Pleuroneetes* or *Platessa*), a genus of so-called 'Flat-fishes.' The common plaice (*Pleuronectes platessa* or *Platessa vulgāris*), a well-known food fish, attains an average length of 12 or 18 inches. The dark or upper side is colored brown, spotted with red or orange; the body is comparatively smooth; the ventral fins are situated on the throat, and are thus jugular in position; the mouth is of small size, and provided with small teeth. These fishes are all 'ground-fishes,' that is, feed and swim near the bottom of the sea. They are caught chiefly by means of trawl-nets.

Plain (plān), a tract of country of nearly uniform elevation; known also as *steppes*, *savannas*, *prairies*, *pampas*. Elevated plains are called *plateaus* or *tablelands*.

Plainfield (plān'fēld), a city of Union Co., New Jersey, in a mountainous district, 24 miles W. S. W. of New York. It has clothing, printing press and tool factories and other industries. There is a large public library and the Muhlenberg Hospital. Pop. 20,550.

Plainfield, a village of Windham Co., Connecticut, in Plainfield township (town), 16 miles N. N. E. of Norwich. Heaters and foundry products are produced, and the town has manufactures of cottons, woolens, yarns, etc. Pop. 6719.

Plain-song, the name given to the old ecclesiastical chant in its most simple state, and without harmonic appendages. It consists largely of monotone, and its inflections seldom exceed the range of an octave. Ambrose of Milan and Gregory the Great introduced certain reforms into the church music of their day, regarding which see *Gregorian Tones*.

Plaintiff (plān'tif), in law courts, the person who commences a suit against another in law or equity.

Plan, in architecture, a drawing showing the design of a building, a term chiefly used in reference to horizontal sections showing the disposition of the walls and various floors of the building, and of the doors and windows, etc.; but also applied to elevations and vertical sections. A *geometrical plan* is one wherein the several parts are represented in their true proportions. A *perspective plan* is one, the lines of which follow the rules of perspective, thus reducing the sizes of the more distant parts. The term is also applied to the draught or representation on paper of any projected work, as the *plan* of a city or of a harbor.

Planarida (plan-ar'i-da), the Planarians, a suborder of flat, soft-bodied annelids, of the order Turbellaria, mostly oval or elliptical in shape, and not unlike the foot of a gasteropodous mollusc. They are, for the most part, aquatic in their habits, occurring in fresh water or on the seashore, but are found occasionally in moist earth. The male and female organs are united in the same individual, and the process of reproduction may be either sexual, by means of true ova, or non-sexual, by internal gemmation or transverse fission.

Planché (plang'shā), JAMES ROBINSON, an English dramatist

and miscellaneous writer, was born in 1796; died in 1880. He came forward early as a writer of pieces for the theater, and also occupied himself with archæology, heraldry, etc., being appointed a pursuivant in the heralds' college, and latterly Somerset herald (1866). He wrote a vast number of extravaganzas, pantomimes, and other light pieces, while among his more serious productions were: *History of British Costume; Introduction to Heraldry; The Pursuivant at Arms*, a treatise on heraldry; *Recollections and Reflections; The Conqueror and his Companions; The Cyclopædia of Costume.*

Planchette (plan-shet'), an instrument used in spiritualistic *séances*. It consists of a heart-shaped board, with wheels under its broad end, and a hole at the pointed end through which a pencil may be thrust. It moves readily when the fingers of sensitives are placed on it, and often writes freely, many long and often very curious communications being thus received.

Plane (plān), a joiner's tool, consisting of a smooth-soled solid block, through which passes obliquely a piece of edged steel forming a kind of chisel, used in paring or smoothing boards or wood of any kind. Planes are of various kinds, as the *jack plane* (about 17 inches long), used for taking off the roughest and most prominent parts of the wood; the *trying plane*, which is used after the jack plane; the *smoothing plane* (7½ inches long) and *block plane* (12 inches long), chiefly used for cleaning off finished work, and giving the utmost degree of smoothness to the surface of the wood; the *compass plane*, which has its under surface convex, its use being to form a concave cylindrical surface. There is also a species of plane called a *rebate plane*, being chiefly used for making rebates. The *plough* is a plane for sinking a channel or groove in a surface, not close to the edge of it. *Molding planes* are for forming moldings, and must vary according to the design. Planes are also used for smoothing metal, and are wrought by machinery. See *Planing Machine.*

Plane, in geometry, a surface such that if any two points in it are joined by a straight line the line will lie wholly within the surface.

Plane, Inclined. See *Inclined Plane.*

Plane-tree (*Platănus*), a genus of trees, natural order Platanaceæ. *P. occidentālis*, the American plane-tree or buttonwood (the *sycamore* or *cotton-tree* of the West), abounds in American forests, and on the banks of the Ohio attains sometimes a diameter of from 10 to 14 feet, rising 60 or 70 feet without a branch. The bark is pale green and smooth, and its epidermis detaches in portions; the fresh roots are a beautiful red; the leaves are alternate, palmated, or lobed; and the flowers are united in little globular, pendant balls. The wood in seasoning takes a dull red color, is fine grained, and susceptible of a good polish, but speedily decays on exposure to the weather. The oriental (*P. orientālis*), resembles the preceding, and is plentiful in the forests of Western Asia. The *P. orientālis* and *P. acerifolia*, from being able to withstand the deleterious influences of a smoky atmosphere, are among the trees most suitable for planting in towns. The *Acer Pseudoplatănus*, the common sycamore or greater maple, is called in Scotland the plane-tree.

Oriental Plane-tree (*Platanus orientālis*).

Planet (plan'et), a celestial body which revolves about the sun as its center (*primary planets*), or a body revolving about another planet as its center (*secondary planets, satellites*, or *moons*). The known *major* planets are, in the order of their proximity to the sun, Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Mercury, Venus, Mars, Jupiter, and Saturn were known to the ancients. Uranus was accidentally discovered by Herschel in 1781, while the discovery of Neptune was the result of pure intellectual work, the calculating of Leverrier and Adams (1845). The planetoids or asteroids are small bodies discovered since the beginning of the nineteenth century between the orbits of Mars and Jupiter. The number of these asteroids

is annually increased by fresh discoveries; over 700 are now known. Mercury, Venus, the Earth, and Mars closely resemble each other in many respects. They are all of moderate size, with great densities; the earth weighing as much as five and a half times an equal bulk of water. They shine only by reflected sunlight. Jupiter, Saturn, Uranus, and Neptune, on the other hand, are of enormous size, of small densities, some of them weighing less than an equal bulk of water, and probably exist at a high temperature, and give out in addition to reflected sunlight a considerable amount of light and heat of their own. Nearly all the planets are attended by moons, varying from one to ten in number. The most colossal of the planets is Jupiter; its volume exceeds that of the earth about 1200 times. Saturn is next in size. Mars, Jupiter, Saturn, Uranus, and Neptune, being outside the earth's orbit, are sometimes called the *superior planets;* Venus and Mercury, being within the earth's orbit, are called *inferior planets.* The family of major planets has also been subdivided into *intra-asteroidal* planets — Mercury, Venus, the Earth, Mars; and *extra-asteroidal* planets — Jupiter, Saturn, Uranus, and Neptune, the character of the two being very different as above described. The planet which approaches nearest to the earth is Venus, the least distance in round numbers being 23 millions of miles; the most distant is Neptune, least distance 2629 million miles. We give here a comparative table of the planets; see also the separate articles.

	Mean Distance from the Sun.	Distance from the Earth.		Time of Revolution round the Sun.	Time of Rotation on Axis.
		Greatest.	Least.		
	Miles.	Miles.	Miles.	Mean Solar Days.	h. m. s.
Mercury ..	35,393,000	135,631,000	47,229,000	87·9692	?
Venus ...	66,131,000	159,551,000	23,309,000	224·7007	23 16 19?
The Earth.	91,430,000	....	....	365·2563	23 56 4
Mars	139,312,000	245,249,000	62,389,000	686·9794	24 37 23
Jupiter ...	475,693,000	591,569,000	408,709,000	4332·5848	9 55 28
Saturn ...	872,135,000	1,014,071,000	831,210,000	10759·2197	10 29 17
Uranus ...	1,753,851,000	1,928,666,000	1,745,806,000	30686·8205	?
Neptune ..	2,746,271,000	2,863,183,000	2,629,360,000	60126·722	?

Planetarium. See *Orrery.*

Planimeter (plā-nim'e-tėr), an instrument by means of which the area of a plane figure may be measured. It is employed by surveyors in finding areas on maps, etc.

Planing Machine, a machine tool for planing wood or metal. For the former purpose the usual form has cutters on a drum rotating on a horizontal axis over the board which is made to travel underneath. The cutter-drum may be repeated underneath and at the edges, so as to plane all sides simultaneously. In planing metals the object to be planed, fixed on a traversing table, is moved against a relatively fixed cutter, which has a narrow point and removes only a fine strip at each cut.

Plankton (plank'tun), a name given to the small animals of the ocean or other waters, taken collectively.

Plant. See *Botany.*

Plantagenet (plan-taj'e-net), a surname first adopted by Geoffrey, Count of Anjou, and said to have originated from his wearing a branch of broom (*plante de genêt*) in his cap. This name was borne by the fourteen kings, from Henry II to Richard III, who occupied the English throne from 1154–1485. In 1400 the family was divided into the branches of Lancaster (Red Rose) and York (White Rose), and from their reunion in 1485 sprang the House of Tudor. See *England.*

Plantagineæ (plan-ta-jin'e-ē), or PLANTAGINA'CEÆ, the plantains, a small nat. order of plants belonging to the monopetalous exogenous series. It consists of herbaceous, rarely suffrutescent, plants, with alternate or radical, rarely opposite, leaves, and inconspicuous flowers on scapes arising from the lower leaves. The rib-grass or ribwort (*Plantāgo lanceolāta*), the root and leaves of which were formerly used in medicine as astringents, is a common type found all over Enrope. See also next article.

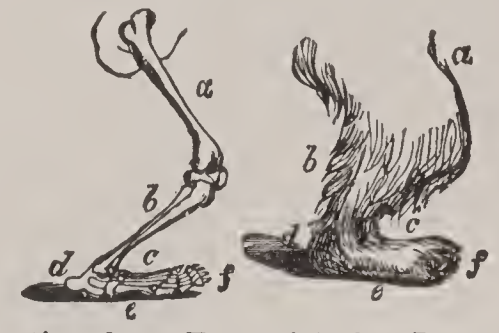
Plantain (plan′tān; *Plantāgo major*), or GREAT PLANTAIN, a common weed, the leaves of which are all radical, oval, and petiolate, and from amongst them arise several long cylindrical spikes of greenish, inconspicuous flowers. The root and seed are still occasionally employed in the treatment of diarrhœa, dysentery, and external sores; the seeds are also collected for the food of birds.—The name is also given to an entirely different plant. See next article.

Plantain, PLANTAIN-TREE, the type of the nat. order Musaceæ. *Musa paradisiăca*, a native of the East Indies, is cultivated in mostly all tropical countries. The stem is soft, herbaceous, 15 to 20 feet high, with leaves often more than 6 feet long and nearly 2 broad. The fruit grows in clusters, is about 1 inch in diameter and 8 or 9 inches long. The stem dies down after fruiting; but the root-stock is perennial, and sends up numerous fresh shoots annually. It is easily propagated by suckers. The banana (which see) is a closely-allied variety or species. Their fruits are among the most useful in the vegetable kingdom, and form the entire sustenance of many of the inhabitants of tropical climates. A dwarf variety, *M. chinensis*, produces a fruit in European hothouses. The fibers of the leaf-stalks of *M. textilis* of the Philippine Islands supplies Manila hemp or abaca, from which cordage of the strongest character is made, the finer fibers being used in making cloth.

Plantain-eaters, a group of perching birds, family Musophagidæ. The genus *Musophăga* of tropical Africa includes the most typical forms. These birds chiefly feed upon the fruit of the banana and plantain-tree. The base of the bill appears as a broad plate covering the forehead. The plumage exhibits brilliant coloration. The members of the genus *Corythaïx* or *Touracos* possess a bill of ordinary size and conformation, and feed on insects in addition to fruits.

Plantation (plan-tā′shun), a term formerly used to designate a colony. The term was later applied to an estate or tract of land in the Southern States of America, the West Indies, etc., cultivated chiefly by negroes or other non-European laborers. In the Southern States the term *planter* is specially applied to one who grows cotton, sugar, rice, or tobacco.

Pantigrada (plan-ti-grā′da), PLANTIGRADES, carnivorous animals in which the whole or nearly the whole sole of the foot is applied to the ground in walking. This section includes the bears, raccoons, coatis, and badgers. Carnivora which, like the



Plantigrada — Foot of Polar Bear.
a, Femur or thigh. *b*, Tibia or leg. *c*, Tarsus or foot. *d*, Calx or heel. *e*, Planta or sole of foot. *f*, Digiti or toes.

weasels and civets, use only part of the sole in walking, are termed *semiplantigrada*.

Plant-lice. See *Aphis*.

Plasencia (pla-sān′thi-a), a walled town in Spain, Estremadura, almost surrounded by the river Yerte, 120 miles W. S. W. of Madrid. Its cathedral, episcopal palace, and ruined towers are the chief objects of interest. Pop. 7965.

Plasma (plas′ma), a siliceous mineral of a green color, which, especially in ancient times, was used for ornamental purposes.

Plassey (pläs′sē), a village in Bengal, on the Hooghly, 80 miles north of Calcutta. Here on June 23, 1757, Colonel, afterwards Lord Clive, with 900 Europeans and 2100 sepoys, defeated Suraja Dowla with an army consisting of 50,000 foot and 18,000 horse, and laid the foundation of the British Empire in India.

Plastering (plas′tėr-ing) is the art of covering the surface of masonry or woodwork with a plastic material in order to give it a smooth and uniform surface, and generally in interiors to fit it for painting or decorations. In plastering the interior of houses a first coat is generally laid on of lime, thoroughly slaked, so as to be free from any tendency to contract moisture, and mixed with sand and cows' hair. For the purpose of receiving this coat the wall is generally first covered with laths or thin strips of wood, with narrow interstices between. The face of the first coat, which should be of considerable thickness, is troweled, or indented with cross lines by the trowel, to form a key for the finishing coats. The second coat is applied to this when it it thoroughly

dried. It is rubbed in with a flat board so as thoroughly to fill the indentations and cover the unequal surface of the first coat with a smooth and even one. In plastering walls great care must be taken to have the surface perfectly vertical. The setting coat, which is of pure lime, or for moldings or finer work of plaster of Paris or stucco, is applied to the second coat before it is quite dry. A thin coating of plaster of Paris is frequently applied to ceilings after the setting coat.

Plaster of Paris, the name given to gypsum (which see) when ground and used for taking casts, etc. If one part of powdered gypsum be mixed with two and a half parts of water a thin pulp is formed, which after a time sets to a hard, compact mass. By adding a small quantity of lime to the moistened gypsum a very hard marble-like substance is obtained on setting.

Plasters are applications of local remedies to any part of the surface of the body by means of a supporting texture of leather, silk or other cloth, or merely of paper. Plasters may be intended to give protection, support, or warmth, or they may be actively medicinal. (See *Blisters.*) The materials most frequently used in plasters are belladonna, cantharides, galbanum, isinglass, lead, mercury, opium, pitch, resin, iron, and soap, and their adhesive property is generally due to the combination of oxide of lead with fatty acids.

Plastic Clay, in geology, a name given to one of the beds of the Eocene period from its being used in the manufacture of pottery. It is a marine deposit.

Plata, La, United Provinces of. See *Argentine Republic.*

Plata (plä'tà), Rio de la (*River of Silver*), or River Plate, runs for more than 200 miles between the Argentine Republic and Uruguay, and is not, strictly speaking, a river, but rather an estuary, formed by the junction of the great rivers Paraná and Uruguay (which see). It flows into the Atlantic between Cape St. Antonio and Cape St. Mary, and has here a width of 170 miles. On its banks are the cities and ports of Montevideo and Buenos Ayres. Navigation is hampered in some parts of the river by shallow water and sand banks. It was discovered in 1515 by Juan Diaz de Solis, and called Rio de Solis; it owes its present name to the famous navigator Cabot.

Platæa (pla-tē'a), a city of ancient Greece, in Bœotia, now wholly in ruins. It has a permanent place in history on account of the great battle which was fought in its vicinity in September, 479 B.C., when 100,000 Greeks under Pausanias defeated about thrice that number of Persians under Mardonius.

Plata'lea. See *Spoonbill.*

Platanista (pla-tan-is'ta), a freshwater dolphin, differing chiefly from the true Delphinidæ in its blowhole being a longitudinal instead of transverse fissure. It is represented by a single species (*P. Gangetica*), which inhabits the estuary of the Ganges. An allied form (*Inia Boliviensis*) inhabits the rivers of Bolivia.

Platanus (plat'a-nus), the plane-tree genus, type of the order Platanaceæ, which consists of this one genus. See *Plane-tree.*

Plate. See *Plate-marks.*

Plateau (pla-tō'). See *Tableland.*

Plate Glass. See *Glass.*

Plate-marks, or Hall-marks, in Britain, a series of marks: hall-mark, sovereign's mark, name-mark (first letter of Christian and surname of maker), and date mark (a variable letter), legally stamped upon gold and silver plate as an index to quality, name of maker, date and place of manufacture. The duty of assaying and stamping gold and silver wares is performed by the Goldsmiths' Company of London. Their marks are a leopard's head crowned, and a lion passant as the sovereign's mark. Affiliated with Goldsmiths' Hall are the following assay offices, each of them having a distinctive mark: Birmingham, an anchor; Chester, three garbs (or sheaves) and a dagger; Exeter, a castle with three towers; Newcastle, three castles; Sheffield, a crown; Edinburgh, a thistle; Glasgow, tree, fish, and bell; Dublin, a harp, crowned. Plate, whether of British or foreign make (the latter bears in addition to the usual marks the letter F in an oval escutcheon), must be of one of the standards prescribed by law, and hall-marked, before it can be dealt in, or even exposed for sale. Forfeiture and a fine of £10 for each article are the penalties attached to breaches of this law. The standards are: gold, 22, 18, 15, 12, and 9 carats (24 carats=pure gold); silver, almost invariably 11 ozs. 2 dwts. per lb. troy. Foreign plate of an ornamental character manufactured before 1800, jewelry with stone settings or so richly chased that it could not be stamped without injury, silver chains, necklets, and

lockets, and a variety of small fancy articles are exempt from hall-marking. Gold plate is liable to a duty of 17*s.* per oz., silver plate 1*s.* 6*d.* per oz.; this duty is payable at the assay offices before the assayed and stamped goods are returned. A rebate of $\frac{1}{8}$th in gross weight is allowed if articles are sent in an unfinished state. All *plain* rings, of whatever weight, are considered as *wedding* rings, and liable to duty, while rings chased or jeweled are free. For dealing in plate of gold above 2 dwts. and under 2 ozs. in weight, or of silver above 5 dwts. and under 30 ozs. per article, a plate license of £2, 6*s.* (renewable annually) is required; for heavier wares the amount of annual license is £5, 15*s.*

Plate-powder, a fine powder for cleaning gold and silver plate, commonly made of a mixture of rouge and prepared chalk.

Plating (plāt'ing), the coating of a metallic article with a thin film of some other metal, especially gold or silver. As regards plating with precious metals, electrodeposition has entirely superseded the old Sheffield method, which consisted in welding plates of various metals at high temperatures. This welding process is now, however, largely employed in plating iron with nickel for cooking vessels, iron with brass for stair-rods and other furnishing and domestic requisites, and lead with tin for pipes, etc. See *Electro-metallurgy.*

Platinum (plat'in-um), a metal discovered in America in the 16th century. Platinum occurs mostly in small, irregular grains, generally contains a little iron, and is accompanied besides by iridium, osmium, rhodium, palladium, ruthenium (hence called the 'platinum metals'), and also sometimes by copper, chromium, and titanium. It was first obtained in Peru, and has since been found in various other localities, such as Canada, Oregon, California, the West Indies, Brazil, Colombia, Borneo, etc., but the chief supply of platinum ore comes from the Ural Mountains in Siberia. It was there discovered in beds of auriferous sands in 1823, and has been worked by the Russian government since 1828. Pure platinum is almost as white as silver, takes a brilliant polish, and is highly ductile and malleable. It is the heaviest of the ordinary metals, and the least expansive when heated; specific gravity 21.53 rolled, 21.15 cast. It undergoes no change from the combined agency of air and moisture, and it may be exposed to the strongest heat of a smith's forge without suffering either oxidation or fusion. Platinum is not attacked by any of the pure acids. Its only solvents are chlorine and nitro-muriatic acid, which act upon it with greater difficulty than on gold. In a finely divided state it has the power of absorbing and condensing large quantities of gases. On account of its great infusibility, and its power generally of withstanding the action of chemical reagents, platinum is much used as a material for making vessels to be used in the chemical laboratory. As a platinum loop or needle it is much used in bacteriological laboratories. Crucibles, evaporating dishes, etc., are very often made of platinum; so also the large stills used for the evaporation of sulphuric acid. The useful alloys of platinum are not numerous. With silver it forms a tolerably fusible white alloy, malleable and brilliant when polished; but it scales and blackens by working. Gold, by a forge heat, combines with platinum, and the alloys, in all proportions, are more fusible than the latter metal. In the proportion of 38 grs. to 1 oz. it forms a yellowish-white, ductile, hard alloy, which is so elastic after hammering that it has been used for watch-springs; but the favorable results expected from them have not been realized. Alloyed with iridium (a rare metal of the same group) it possesses an excellent and unalterable surface for fine engraving, as in the scales of astronomical instruments, etc. This alloy has also been adopted for the construction of international standards of length and weight. Mercury, by trituration with spongy platinum, forms an amalgam at first soft, but which soon becomes firm, and has been much used in obtaining malleable platinum. A coating of platinum can be given to copper and other metals by applying to them an amalgam of spongy platinum and 5 parts of mercury; the latter metal is then volatilized by heat. Lead combines with platinum readily; and iron and copper in like manner. The last mentioned, when added in the proportion of 7 to 16 of platinum and 1 of zinc, and fused in a crucible under charcoal powder, forms the alloy called artificial gold. Steel unites with platinum in all proportions, and, especially in the proportion of from 1 to 3 per cent. of platinum, forms a tough and tenacious alloy, well adapted for cutting instruments. Arsenic unites easily with platinum, and is sometimes employed for rendering the latter metal fusible. An alloy of platinum, iridium, and rhodium is used for making crucibles, etc. It is harder than pure platinum, is less easily attacked by chemical reagents, and bears a higher temperature without fusing.

Plato (plā'tō), an ancient Greek philosopher, founder of one of the great schools of Greek philosophy, was born at Athens in B.C. 429; died in B.C. 347. Few particulars of his life are known, but it is beyond doubt that he was well connected and carefully educated. About his twentieth year he came directly under the influence of Socrates, and from this time he gave himself entirely to philosophy. Until the death of Socrates (B.C. 399) he appears to have been his constant and favorite pupil; but after that event Plato is supposed to have left Athens with a view to improving his mind by travel. He is said to have visited Cyrene (in North Africa), Lower Italy, and Sicily. Various other journeys are attributed to him, but without sufficient authority. About B.C. 389 or 388 Plato returned to Athens and began to teach his philosophical system in a gymnasium known as the Academy, his subsequent life being unbroken, except by two visits to Sicily. He appears to have had a patrimony sufficient for his wants, and taught without remuneration. One of his pupils was Aristotle.

Plato.— Antique gem.

The reputed works of Plato consist of *Dialogues* and *Letters*, the latter now regarded as spurious; but the genuineness of most of the *Dialogues* is generally admitted. The chronology of the latter is a matter of uncertainty. The first attempt at a critical arrangement was made by Schleiermacher, who adopted an arrangement into three divisions, according to the leading doctrines he believed they were intended to inculcate. The chief works in the first section are Phædrus, Protagoras, Parmenides, Lysis, Laches, Charmides, Euthyphron; in the second, Theætetus, Sophistes, Politicus, Phædo, Philebus, Gorgias, Meno, Euthydemus, Cratylus, Symposium; in the third, the Republic, Timæus, Critias, and the Leges or Laws. Hermann has attempted to make out a chronological arrangement, and other scholars who differ from Schleiermacher have attempted various theories of constructive arrangement. These schemes in general proceed on the assumption that each dialogue, being an artistic whole, forms a link in a chain. Grote and others, however, do not admit that Plato followed any plan either artistic or didactic. Apart from their philosophical teaching the dialogues of Plato are admirable as works of literature, especially for their dramatic truthfulness, and exhibit Greek prose in its highest perfection. In all of them Socrates (idealized) appears as one of the speakers. They contain also lively and accurate accounts of previous systems of Greek philosophy and their teachers, introduced not merely for historical purposes, but as incidental to the analysis of their opinions. There is an excellent English translation of the whole by Jowett.

The philosophy of Plato must be regarded as one of the grandest efforts ever made by the human mind to compass the problem of life. After the example of Socrates, he held the great end of philosophic teaching to be to lead the mind of the inquirer to the discovery of truth rather than to impart it dogmatically, and for this end he held oral teaching to be superior to writing. This preference appears to have determined the conversational form given to most of his works. Plato originated the distinction of philosophy into the three branches of ethics, physics, and dialectics, although these names were first applied by his disciple Xenocrates. The cardinal principle of Plato's dialectical system is the doctrine of ideas. True science, according to him, was conversant, not about those material forms and imperfect intelligences which we meet with in our daily intercourse with men; but it investigated the nature of those purer and more perfect patterns which were the models after which all created beings were formed. These perfect types he supposes to have existed from all eternity, and he calls them the *ideas* of the great original Intelligence. As these cannot be perceived by the human senses, whatever knowledge we derive from that source is unsatisfactory and uncertain. Plato, therefore, maintains that degree of skepticism which denies all permanent authority to the evidence of sense. Having discovered or created the realm of ideas, he surveyed it throughout. He defined its most excellent forms as beauty, justice, and virtue, and having done so he determined what was the supreme and dominant principle of the whole. It is the idea of the Good. The harmony of intelligence throughout its entire extent with goodness: this is the highest attainment of Plato's philosophy. His ethical system was in direct dependence upon his dialectics. He believed that the ideas of all existing things were originally contained

in God. These ideas were each the perfection of its kind, and as such were viewed by God with approval and love. God himself being infinitely good was the object of all imitation to intelligent beings; hence the ethics of Plato had a double foundation, the imitation of God and the realization of ideas, which were in each particular the models of perfection. To his cosmical theories he attributed only probability, holding that the dialectical method by which truth alone could be discovered was applicable only to ideas and the discovery of moral principles. The most valuable part of Plato's cosmogony is its first principle, that God, who is without envy, planned all things that they should be as nearly as possible like himself. Plato's political treatises are the application of his ethical principles to social organization. His genius was more adapted to build imaginary republics than to organize real ones; hence his judgment of statesmen is also faulty and often unjust, as, for instance, in the case of Pericles and Themistocles. He was guided by one grand principle, which is mentioned in several of his writings, that the object of the education and instruction of young people, as well as of the government of nations, is to make them better; and whoever loses sight of this object, whatever merit he may otherwise possess, is not really worthy of the esteem and approbation of the public.

The followers of Plato have been divided into the Old, Middle, and New Academies; or into five schools: the first representing the Old, the second and third the Middle, and the fourth and fifth the New Academy. In the first are Speusippus, Xenocrates, Heraclides, and others. Of these, the first reverted to pantheistic principles, the second to mysticism, and the last was chiefly distinguished as an astronomer. In the Middle Academy, of which were Arcesilas and Carneades, the founders of the second and third school, skeptical tendencies began to prevail. The New Academy began with Philo of Larissa, founder of the fourth school. Its teachings, however, deviated widely from his views.

Platoff (plä'tof), hetman of the Cossacks and a distinguished Russian cavalry officer, born about 1763–65; died 1818. He successfully fought the Turks in Moldavia, and largely contributed to the great disaster which befell the French army retreating from Moscow in 1812.

Platonic Love (pla-ton'ik), a term by which is generally understood a pure spiritual affection between the sexes unmixed with carnal desires, and regarding the mind only and its excellences.

Platoon (pla-tön'), in military language, meant formerly a small body of men in a battalion of foot, etc., that fired alternately. The term is now applied to two files forming a subdivision of a company; hence also *platoon-firing*, firing by subdivisions.

Platt, Thomas Collier, political leader, born at Oswego, New York, in 1833; died in 1910. He was elected to Congress in 1873 and to the Senate in 1881, but resigned the same year, with his colleague Conkling, from opposition to President Garfield's civil service policy. In 1880 he became president of the United States Express Company. His time was largely devoted to political management, and for years he was the autocrat of the Republican party in New York. He was re-elected to the Senate in 1896 and again in 1903.

Plattdeutsch (plät'doich), or Low German, is the language of the North German Lowlands, from the borders of Holland to those of Russian Poland. The Dutch and Flemish languages also belong to the Low German dialects, but being associated with an independent political system, and having a literature of their own, are reckoned as distinct languages. The Low German dialects agree in their consonantal system not only with Dutch and Flemish, but also with English and the Scandinavian tongues. (See *Philology.*) Until the Reformation Low German was the general written language of the part of the continent above mentioned; but from that time Low German works became gradually fewer, owing to the position now taken by the High (or modern classical) German. Even as a spoken language High German has ever since been slowly superseding the Low. In recent times, however, Low German literature has received a new impetus from Klaus Groth and Fritz Reuter. Linguistically the Low German dialects have received a good deal of attention, and many valuable lexicographical works have appeared.

Platte (plat), a river of the western United States, which rises in the Rocky Mountains by two branches, called respectively the North and South Forks of the Platte. The united stream falls into the Missouri after a course of about 1600 miles. It is from 1 mile to 3 miles broad, shallow, encumbered with islands, has a rapid current, and is therefore not navigable.

Plattensee (plat'ėn-zā). See *Balaton.*

Plattner (plat'nėr), Carl Friedrich, a German metallurgist, born in 1800; died in 1858. From 1842–57 he held the professorship of metallurgy at Freiberg, and taught and experimented with great success. He is best known for his application of the blowpipe to the quantitative assay of metals.

Plattsburg (platz'burg), a town of New York, capital of Clinton Co., on Cumberland Bay, Lake Champlain, at the mouth of Saranac River, 138 miles N. by E. of Albany. It is a lake port of entry, with a good harbor, lumber, iron, and grain being the chief articles of export. The river supplies abundant water power, and iron, flour, sewing machines, pulp, paper, etc., are manufactured. Plattsburg is an important military post, with one of the largest barracks in the United States. Near here, on Sept. 11, 1814, Commodore McDonough gained a complete victory over the British lake fleet, and an army which had attacked the town was also repulsed. Pop. 11,138.

Plattsmouth, a city, capital of Cass Co., Nebraska, on the Missouri River, 22 miles S. of Omaha. A steel bridge 2900 feet long here crosses the river. There are railroad shops, flour mills, etc., and a trade in grain and cattle. Pop. 4287.

Platyelmia (pla-ti-el'mi-a; 'Flatworms'), a division of the class Scolecida. They are represented by the tapeworm, 'flukes,' etc.

Platypus (plat-i'pus). See *Ornithorhynchus.*

Platyrhina (plat-i-rī'na). See *Monkeys.*

Plauen (plou'en), a thriving manufacturing town in Saxony, circle of Zwickau, in a beautiful valley on the left bank of the Elster, 60 miles S. of Leipzig, 78 miles W. S. W. of Dresden. It is walled and has a castle. Manufactures machinery, paper, leather, calicoes, and extensively all kinds of embroidered goods. Pop. (1905) 105,383.

Plautus (plą'tus), Titus Maccius, one of the oldest and best Roman comic writers, and one of the founders of Roman literature, born at Sarsina, in Umbria, about B.C. 254; died B.C. 184. We have few particulars of his life. He is said to have been first connected with a dramatic company at Rome; then to have engaged in business, but losing his means was at one time in a very destitute condition, and compelled to earn his livelihood by turning a baker's handmill. At this period he became a successful writer of comedies. The purity of his language, his genuine humor, and his faithful portrayal of middle and lower class Roman life made him a great favorite with the Roman public, and his plays successfully held the stage for some centuries. He was much admired by Cicero and Varro. For his characters, plots, scenes, etc., he was chiefly indebted to the poets of the new Attic comedy, but the language was his own. Some twenty of his plays have been preserved to us, a few of them more or less mutilated.

Playfair (plā'fār), John, a Scottish natural philosopher and mathematician, born in Forfarshire in 1748; died at Edinburgh in 1819. He entered the University of St. Andrews at fourteen, where he soon displayed special talent for mathematics and natural philosophy. Having entered the church he held a living for some years. In 1785 he was chosen assistant professor of mathematics in the University of Edinburgh. In 1802 appeared his *Illustrations of the Huttonian Theory of the Earth*, and in the following year a *Biographical Account of Dr. James Hutton.* In 1805 he obtained the chair of natural philosophy in Edinburgh University. The Royal Society of London elected him a member in 1807. He paid a visit to the continent in 1815, and spent some seventeen months in France, Switzerland, and Italy. He published *Elements of Euclid* and *Outlines of Natural Philosophy*, and contributed many valuable papers to the *Transactions* of the Royal Society of Edinburgh, the Royal Society of London, and the *Edinburgh Review.* His writings are models of composition and argument.

Playfair, Sir Lyon, a British scientist and politician, son of Dr. G. Playfair, inspector-general of hospitals in Bengal, was born at Meerut, Bengal, in 1819, and educated at St. Andrews and Edinburgh universities. He studied chemistry under Graham in Glasgow and London, and under Liebig at Giessen. His able reports on the sanitary condition of the large towns of Britain, and his valuable services as special commissioner at the London Exhibition of 1851 first brought him prominently before the public. He became connected with the science and art department at its establishment in 1853, inspector-general of government museums and schools of science in 1856, and was professor of chemistry at Edinburgh University, 1858-69. Besides his scientific memoirs he published numerous important papers on political, social, and educational subjects. Most of these economical essays have recently been collected and

published under the title *Subjects of Social Welfare*. He died in 1898.

Playing Cards. See *Card*.

Plebeians (ple-bē′anz), or PLEBS, in ancient Rome, one of the great orders of the Roman people, at first excluded from nearly all the rights of citizenship. The whole government of the state, with the enjoyment of all its offices, belonged exclusively to the Patricians, with whom the Plebeians could not even intermarry. The civil history of Rome is to a great extent composed of the struggles of the Plebeians to assert their claim to the place in the commonwealth to which their numbers and social importance entitled them, and which were crowned with complete success when (B.C. 286) the Lex Hortensia gave the *plebiscita*, or enactments passed at the plebeian assemblies, the force of law. From this time the privileges of the two classes may be said to have been equal.

Plebiscite (pleb′i-sīt), a vote of a whole nation obtained by universal suffrage, a form of voting introduced into France under the Napoleonic régime, and named after the Roman *plebiscita*. (See above article.) The term is also used in a more general sense.

Plectognathi (plek-tog′na-thi), a suborder of Teleostean fishes, distinguished by the maxillary and intermaxillary bones on each side of the jaw being firmly united together by bony union. The head is large, and the union of its bones firmer than in any other Teleostean fishes; the body generally short, skin horny, fins small and soft. As examples of the chief fishes included in this group we may cite the trunk-fishes, the file-fishes, the globe-fishes, the sun-fishes, etc.

Pledge (pledj), or PAWN, in law, is a species of bailment, being the deposit or placing of goods and chattels, or any other valuable thing of a personal nature, as security for the payment of money borrowed, or the fulfillment of an obligation or promise. If the money is not paid at the time stipulated the pawn may be sold by the pawnee, who may retain enough of the proceeds to pay the debt intended to be secured. See *Pawnbroker*.

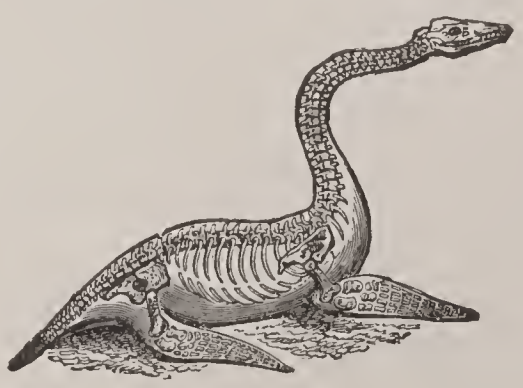
Pleiades (plī′a-dēz), the so-called 'seven stars' in the neck of the constellation Taurus, of which only six are visible to the naked eye of most persons. They are regarded by Mädler as the central group of the Milky Way. Ancient Greek legends derive their name from the seven daughters of Atlas and the nymph Pleione, fabled to have been placed as stars in the sky, and the loss of the seventh was variously accounted for. In reality the cluster consists of far more than seven stars.

Pleistocene (plīs′to-sēn; Gr. *pleistos*, most, and *kaimos*, recent), in geology, the lower division of the Post-tertiary formation. It is also known as the GLACIAL SYSTEM, and rests upon the Pliocene, being the latest of the fossil-bearing formations. The fossil remains belong almost wholly to existing species. The Pleistocene mollusca all belong to still living species, but its mammals include a few extinct forms. It is also known as the 'glacial' or 'drift' period, owing to the great prevalence of glaciers and icebergs at that period. See *Pliocene*.

Plenipotentiary (plen-i-pō-ten′shâ-ri), an ambassador appointed with full power to negotiate a treaty or transact other business. See *Ministers*.

Pleonasm (plē′u-nazm), in rhetoric, is a figure of speech by which we use more words than seem absolutely necessary to convey our meaning, in order to express a thought with more grace or greater energy; it is sometimes also applied to a needless superabundance of words.

Plesiosaurus (plē-si-o-sạ′rus), a genus of extinct amphibious animals, nearly allied to the Ichthyosaurus. The remains of this curious genus were first brought to light in the Lias of Lyme Regis in 1822, but over twenty species are now known, and they have formed the subject of important memoirs by Owen and other palæontologists. Its neck was of enormous length,



Plesiosaurus, partially restored.

exceeding that of its body; it possessed a trunk and tail of the proportions of an ordinary quadruped; to these were added the paddles of a whale. The neck vertebræ numbered forty or fewer. From twenty to twenty-five dorsal segments existed; and two sacral vertebræ and from thirty to forty caudal segments completed

the spine. No distinct breastbone was developed. The head was not more than 1-12th or 1-13th of the length of the body; the snout of a tapering form; the orbits large and wide. The teeth were conical, slender, curved inwards, finely striated on the enameled surface, and hollow throughout the interior. These animals appear to have lived in shallow seas and estuaries, and, in the opinion of some, they swam upon or near the surface, having the neck arched like the swan, and darting it down at the fish within reach. Some of the Plesiosauri were upwards of 20 feet long. Their remains occur from the Lias to the Chalk rocks inclusive, these forms being thus exclusively of the Mesozoic age.

Plethora (pleth'u-ra), in medicine, an excess of blood in the human system. A florid face, rose-colored skin, swollen blood-vessels, frequent nose-bleeding, drowsiness and heavy feeling in the limbs, and a hard and full pulse are symptoms of this condition, habitual in many persons, and which, if not actually a disease, yet predisposes to inflammations, congestions, and hemorrhages. Plethora may, however, develop in persons of all conditions and ages as the result of too much stimulating food (as an excessive meat-diet), overeating, large consumption of malt and spirituous liquors, residence in northern and elevated regions with sharp, dry air, want of exercise, too much sleep, amputation of a limb — in short, of any action tending to unduly increase the volume of blood. Plethora of a mild form may be reduced by copious draughts of diluents, a vegetable diet, and plenty of exercise; but in cases requiring prompt relief leeches or bleeding must be resorted to.

Pleura (plö'ra), the serous membrane lining the cavity of the thorax or chest, and which also covers the lungs. Each lung is invested by a separate pleura or portion of this membrane. In the thorax each pleura is found to consist of a portion lining the walls of the chest, this fold being named the *parietal layer* of the pleura. The other fold, reflected upon the lung's surface, is named in contradistinction the *visceral layer*. These two folds inclose a space known as the *pleural cavity*, which in health contains serous fluid in just sufficient quantity to lubricate the surfaces of the pleuræ as they glide over one another in the movements of respiration. The disease to which the pleuræ are most subject is *pleurisy* (which see).

Pleurisy (plö'ri-si), the inflammation of the pleura. It may be acute or chronic, simple or complicated with catarrh and pneumonia. Generally part only of the pleura is affected, but sometimes the inflammation extends to the whole, and even to both pleuræ (double pleurisy). Acute, it is a very common complaint, due to a variety of causes, but most frequently to sudden chills. It invariably commences with shivering, its duration and intensity generally indicating the degree of severity of the attack; fever and its attendant symptoms succeed the shivering. A sharp, lancinating pain, commonly called stitch in the side, is felt in the region affected at each inspiration. A short, dry cough also often attends this disease. While the inflammation continues its progress a sero-albuminous effusion takes place, and when this develops the febrile symptoms subside, usually from the fifth to the ninth day. Acute pleurisy is seldom fatal unless complicated with other diseases of the lungs or surrounding parts, and many patients are restored simply by rest, moderate sweating in bed, spare and light diet, mild and warm drinks, and the application of hot mustard and linseed-meal poultices to the affected part. Opiates to relieve pain are often needful. When acute pleurisy is treated too late or insufficiently it may assume the chronic condition, which may last from six weeks to over a year, and result in death from gradual decay, as in the case of consumptives, or from asphyxia. Chronic pleurisy is characterized by effusion, which accumulates in the pleural cavity, and soon tends to produce lesions and complications in the surrounding organs. Besides local treatment purgatives and diuretics are used, but if the disease does not yield to these remedies, the liquid must be evacuated by operation. Pleurisy, acute and chronic, sometimes also appears without accompanying pain; it is then called *latent* pleurisy.

Pleurisy-root. See *Butterfly-weed.*

Pleuronectidæ (plö-rō-nek'ti-dē), the group of fishes included in the section Anacanthini of that order, and represented by the soles, flounders, brill, turbot, halibut, plaice, etc. The scientific name Pleuronectidæ therefore corresponds to the popular designation of 'Flat-fishes' applied to these forms.

Pleuro-pneumonia (plö'rō-nö-mō'ni-a), a form of pneumonia peculiar to the bovine race. It is highly contagious, and proves rapidly fatal. It first manifests itself in a morbid condition of the general system; but its seat is in the lungs and the pleura, where it causes an abundant inflamma-

tory exudation of thick plastic matter. The lungs become rapidly filled with this matter, and increase greatly in weight. Whether pleuro-pneumonia is specifically a local or general disease is disputed, as also the manner of treatment. On the one hand, bleeding and mercurial treatment, as in pleurisy and pneumonia, are recommended. On the other, evacuating remedies, maintaining the strength of the animal, and promoting the action of the skin, bowels, and kidneys, are employed.

Plevna (plev'na), the chief town of one of the new districts into which the principality of Bulgaria is divided. It lies a little over 3 miles east of the Vid, a tributary of the Danube, and commands a number of important roads, being hence of some strategetical importance. It is noted for the gallant resistance of its garrison under Osman Nubia Pasha during the last Russo-Turkish war. Pop. (1906) 21,208.

Pleyel (plā'el), IGNAZ, composer, was born in Austria in 1757; died at Paris in 1831. He studied under Haydn, and rapidly created a reputation in Italy, France, and England. He founded a musical establishment at Paris, which became one of the most important in Europe, and edited the *Bibliothèque Musicale*, in which he inserted the best works of the Italian, German, and French composers. His own works, chiefly instrumental pieces, are light, pleasing, and expressive.

Plica Polonica (plē'ka po-lon'i-ka), or TRICHOMA (trī-kō'ma), a disease peculiar to Poland and the immediately adjacent districts, but which at one time was also common in many parts of Germany. The roots of the hair swell, a nauseous, glutinous fluid is secreted, and the hair becomes completely matted. It is generally confined to the head, but other parts of the body covered with hair may also be affected; and sometimes the nails become spongy and blacken.

Plim'soll, SAMUEL, known as 'the sailor's friend,' a legislator, born at Bristol, England, in 1824. In 1854 he started business in the coal trade in London, and shortly afterward began to interest himself in the sailors of the mercantile marine, and the dangers to which they were exposed, especially through overloading, and the employment of unseaworthy ships. He entered Parliament in 1868, and succeeded in getting passed the Merchant Shipping Act in 1876. In 1890 the fixing of the load line was taken out of the owner's discretion and made a duty of the Board of Trade. He died in 1898.

Plinth, in architecture, the lower square member of the base of a column or pedestal. In a wall the term plinth is applied to the plain projecting band at its lowest part.

Pliny (plin'i), CAIUS PLINIUS SECUNDUS, a Roman writer, commonly called *Pliny the Elder*, was born A.D. 23, probably at Comum (Como). He came to Rome at an early age, and having means at his disposal availed himself of the best teachers. He served with distinction in the field, and after having been made one of the augurs of Rome, he was appointed governor of Spain. Every leisure moment that he could command was devoted to literature and science, and his industry was so great that he collected an enormous mass of notes, which he utilized in writing his works. He adopted his nephew, Pliny the Younger, A.D. 73, and perished in the eruption of Mount Vesuvius which overwhelmed Pompeii and Herculaneum in 79. The only work of Pliny which is now extant is his *Natural History*, a work containing a mass of information on physics, astronomy, etc., as well as natural history proper, fable and fact being intermingled.

Pliny, CAIUS PLINIUS CÆCILIUS SECUNDUS, *the Younger*, a nephew of the former, was born A.D. 61 at Comum (Como). Having lost his father at an early age, he was adopted by his uncle, and inherited the latter's estates and MSS., and also his industry and love of literature. He filled several public offices, and was consul in A.D. 100. In A.D. 103 he was appointed prætor or governor of the province of Pontica, which office he administered for almost two years to the general satisfaction. He was one of the most distinguished and best men of his age. The time of his death is unknown, but it is supposed that he died about the year 115. As an author he labored with ardor, and attempted both prose and poetry. Of his writings only a collection of letters in ten books, and a panegyric on Trajan, remain.

Pliocene (plī'u-sēn; Gr. *pleion*, more; *kainos*, recent), a geological term applied to the most modern of the divisions of the Tertiary epoch. The Tertiary series Sir C. Lyell divided into four principal groups, namely, the *Eocene* and the *Miocene* (which see), the *Older Pliocene*, and the *Newer Pliocene* or *Pleistocene*, each characterized by containing a very different proportion of fossil *recent* (or existing) species. The Newer Pliocene, the latest of the four, contains from 90 to 95 per cent. of recent

fossils; the Older Pliocene contains from 35 to 50 per cent. of recent fossils. The Newer Pliocene period is that which immediately preceded the recent era; and by the latest system of classification it has been removed from the Tertiary and placed in the Post-tertiary or Quaternary epoch. The Pliocene period proper, or the Crag period, is that which intervened between the Miocene and the Newer Pliocene. Both the Newer and the Older Pliocene exhibit marine as well as fresh-water deposits.

Plock, PLOTZK (plotsk), capital of the government of the same name in Russian Poland, on the right bank of the Vistula, 78 miles N. W. of Warsaw. It has a handsome cathedral, dating from the tenth century, and a bishop's palace. Its manufactures are unimportant, but it has a large trade. Pop. 27,073.— The province has an area of 3674 square miles, mostly level, and marshes and lakes abound. Fully one-third of the area is forest. Corn and potatoes are the chief agricultural products, and sheep and cattle are extensively reared. Pop. (1906) 619,000.

Plotinus (plō-tī'nus), the systematic founder of Neo-Platonism, born in 205 A.D., at Lycopolis, in Egypt; died in the Campagna, Italy, 270. Little is known of his early life. In his twenty-eighth year the desire to study philosophy awoke in him, but he got no satisfaction from his teachers till a friend led him to Ammonius Saccas (which see). He spent eleven years near this excellent master, and the knowledge he had acquired created an ardent desire in him to know also the teachings of the Persian and Indian philosophers. For this purpose he joined the expedition of the Emperor Gordian to the East in 242, but after the latter's death he reached Antioch with difficulty and returned to Rome, where he subsequently lived and taught. At first he taught orally, but after ten years he was prevailed upon to commit his doctrines to writing, and he composed twenty-one books, which were only put into the hands of the initiated. About 262–264 Porphyry became his pupil, and during his six years' stay in Rome, twenty-four books were written by Plotinus, and nine more after Porphyry had left for Sicily. On account of the weakness of his sight Plotinus left the correction of his works to Porphyry, who also was his literary executor, and has arranged his works in six *Enneads*, which form the bible of the New Platonists. His teaching secured him great respect and popularity among the Romans. He was held to be so wise and virtuous that parents left their children to his care. He enjoyed the favor of the Emperor Gallienus, and he even succeeded in inspiring the fair sex with a desire to study philosophy. The writings of Plotinus are often obscure and even incomprehensible, but on the whole they exhibit a fertiie and elevated mind and close reasoning. His system depends less upon the intrinsic truth it contains than upon its historical value, which is great both in its antecedents and consequents. Plotinus was well acquainted with the older Greek philosophy, with the Ionian and the Eleatic schools, with Plato and Aristotle and other founders of systems, and according to the eclectic tendencies of his day he believed there was a fundamental unity in these various systems. It was to Plato, however, that Plotinus looked as his great authority. He believed himself a strict follower of Plato, and his own system a legitimate development of the principles of that great philosopher.

Plover (pluv'er), the common name of several species of grallatorial birds belonging to the genus *Charadrius*. They inhabit all parts of the world. They are gregarious, and most of them are partial to the muddy borders of rivers and marshy situations, subsisting on worms and various aquatic insects; but some of them affect dry sandy shores. Their general features are: bill long, slender, straight, compressed; nostrils basal and longitudinal; legs long and slender,

Golden Plover (*Charadrius pluviālis*).

with three toes before, the outer connected to the middle one by a short web; wings middle-sized. Most of them molt twice a year, and the males and females are seldom very dissimilar in appearance. The various species pass so imperceptibly into one another that their classification is often attended with difficulty. All nestle on the ground. They run much on the soil, patting it with their feet to bring out the worms, etc. The golden plover (*Charadrius pluviālis*), also called yellow and whistling plover, is the best

Reproduced by permission of the Philadelphia Museums.

PLOWING BY STEAM

The traction engine is pulling thirty disc plows. Great economies of time and labor have been effected by this method on the large farms in the West.

known, and its flesh and its olive-green, dark-spotted eggs are considered a delicacy by epicures.

Plow (plou), an implement drawn by animal or steam power, by which the surface of the soil is cut into longitudinal slices, and these successively raised up and turned over. The object of the operation is to expose a new surface to the action of the air, and to render the soil fit for receiving the seed or for other operations of agriculture. Plows drawn by horses or oxen are of two chief kinds: those without wheels, commonly called *swing-plows*, and those with one or more wheels, called *wheel-plows*. The essential parts of both kinds of plows are, the beam, by which it is drawn; the stilts or handles, by which the plowman guides it; the coulter, fixed into the beam, by which a longitudinal cut is made into the ground to separate the slice or portion to be turned over; the share, by which the bottom of the furrow-slice is cut and raised up; and finally, the mold-board, by which the furrow-slice is turned over. The wheel-plow is merely the swing-plow with a wheel or pair of wheels attached to the beam for keeping the share at a uniform distance beneath the surface. Besides these two kinds there are *subsoil-plows*, *drill-plows*, *draining plows*, etc. Every part of a plow of the modern type is made of iron. *Double mold-board* plows are common plows with a mold-board on each side, employed for making a large furrow in loose soil, for earthing-up potatoes, etc. *Turn-wrest plows* are plows fitted either with two mold-boards, one on each side, which can be brought into operation alternately, or with a mold-board capable of being shifted from one side to the other, so that, beginning at one side of a field, the whole surface may be turned over from that side, the furrow being always laid in the same direction. One of these plows with two mold-boards is so constructed as to be dragged by either end alternately, the horses and plowmen changing their position at the end of every furrow. Such plows are useful in plowing hillsides, as the furrows can all be turned towards the hill, thus counteracting the tendency of the soil to work downwards. In the most improved style of wheel-plow there are a larger and a smaller wheel, the former to run in the furrow, the latter on the land. These have also a second or skim coulter, for use in lea plowing, to turn over more effectually the grassy surface. What is called a *gang-plow* is essentially a number of plows combined, four, six, or eight shares being fixed in one wheeled frame, and dragged by a sufficient number of horses, such plows being used on very large farms.—*Steam-plows* on various principles have also been adopted. Some are driven by one engine remaining stationary on the headland, which winds an endless rope (generally of wire) passing round pulleys attached to an apparatus called the 'anchor,' fixed at the opposite headland, and round a drum connected with the engine itself. Others are driven by two engines, one at either headland, thus superseding the 'anchor.' As steam-plowing apparatus are usually beyond both the means and requirements of single farmers, companies have been formed for hiring them out. In steam-plowing it is common to use plows in which two sets of plow bodies and coulters are attached to an iron frame moving on a fulcrum, one set at either extremity, and pointing different ways. By this arrangement the plow can be used without turning, the one part of the frame being raised out of the ground when moving in one direction, and the other when moving in the opposite. It is the front part of the frame, or that farthest from the driver, which is elevated, the plowing apparatus connected with the after part being inserted and doing the work. Generally two, three, or four sets of plow bodies and coulters are attached to either extremity, so that two, three, or four furrows are made at once. In addition to the stationary engine, gasoline motors have been introduced to draw plows, one of these taking the place of a considerable number of horses. The plow, as originally used, was a very rude and ineffective instrument, and plows of this imperfect character are still in use even in parts of Europe. Small plows are made for hand-plowing.

Plow-land, is an equivalent expression with a *hide* of land. It is defined as containing as much land as may be tilled in a year and a day by one plow. It was fixed by 7 and 8 William III cap. xxix, for the purpose of repairing highways, at an annual value of £50. The quantity contained in a plow-gate appears to differ in different charters.

Plow Monday, the next Monday after Twelfth Day. On Plow Monday the plowmen in the northern part of England used to draw a plow from door to door, and beg money for drink.

Plum (*Prunus*), a genus of plants belonging to the natural order Rosaceæ, suborder Amygdaleæ. About a dozen species are known, all inhabiting the north temperate regions of the globe. They are small trees or shrubs, with alternate leaves and white flowers, either soli-

tary or disposed in fascicles in the axils of the leaves. The common garden plum (*P. domestica*), introduced from Asia Minor, is the most extensively cultivated, and its fruit is one of the most familiar of the stone-fruits. The varieties are very numerous, differing in size, form, color, and taste. Some are mostly eaten fresh, some are dried and sold as prunes, others again are preserved in sugar, alcohol, sirup, or vinegar. They make also excellent jams and jellies, and the sirup from stewed plums forms a refreshing drink for invalids, and a mild aperient for children. Perhaps the most esteemed of all varieties is the green gage. (See *Green Gage.*) A very popular and easily grown sort is the *P. damascēna* or damson. The wood of the plum-tree is hard, compact, traversed with reddish veins, susceptible of a fine polish, and is frequently employed by turners and cabinet-makers. The sloe or black-thorn (*P. spinōsa*) is a species of wild plum bearing a small, round, blue-black, and extremely sour fruit. Its juice is made into prune-wine, which is chiefly employed by distillers, wine and spirit merchants, etc., for fining, coloring, purifying, and mellowing spirits.

Plumbaginaceæ (plum-ba-jin-ā'-se-ē), PLUMBAGIN'EÆ, a nat. order of exogens, consisting of (chiefly maritime) herbs, somewhat shrubby below, with alternate leaves, and regular pentamerous, often blue or pink flowers. As garden plants nearly the whole of the order is much prized for beauty, particularly the Statices. The common thrift or sea-pink (*Armeria maritima*), with grass-like leaves and heads of bright pink flowers, is a familiar example. The type of this order is the genus *Plumbāgo.* It consists of perennial herbs or undershrubs, with pretty blue, white, or rose-colored flowers in spikes at the ends of the branches. *P. Europæa* is employed by beggars to raise ulcers upon their bodies to excite pity. Its root contains a peculiar crystallizable substance which gives to the skin a lead-gray color, whence the plant has been called *leadwort.*

Plumbago (plum-bā'go). See *Graphite.*

Plummet (plum'et), PLUMB-LINE, a leaden or other weight let down at the end of a cord to regulate any work in a line perpendicular to the horizon, or to sound the depth of anything. Masons, carpenters, etc., use a plumb-line fastened on a narrow board or plate of brass or iron to judge whether walls or other objects are perfectly perpendicular, or *plumb,* as the artificers call it. Near a range of high mountains the plumb-line, as can be shown by special arrangements, is not perfectly true, but inclines towards the mountains; and officers in charge of the United States Coast and Geodetic Survey among the Hawaiian Islands, have recently observed that the deviation of a plumb-line from the vertical is greater in the case of mountains in an island than in that of continental mountains, and greater in the neighborhood of extinct volcanoes than in that of active volcanoes. In given localities the plumb-line also varies according to the ebb and flow of the tide.

Plumptre (plump'tėr), EDWARD HAYES, Dean of Wells, born in 1821. He was graduated from Oxford, appointed chaplain at King's College, London, and was made professor of pastoral theology in 1853. He held various pastoral positions, and as an able theologian and preacher was chosen a member of the Old and New Testament Revision Companies in England, select preacher at Oxford (several times), Boyle lecturer, 1866-67, and Grinfield lecturer, 1872-74. He wrote a number of valuable works on theology, and we have from his pen several translations, including Sophocles (1866), Æschylus (1870), Dante (1887). He died in 1891.

Plumule (plö'mūl), in botany, that part of the seed which grows into the stem and axis of the future plant. In the seeds of the bean, horse-chestnut, etc., the plumule is distinctly visible, but in plants generally it is scarcely perceptible without the aid of a magnifying glass, and in many it does not appear until the seed begins to germinate. The first indication of development is the appearance of the plumule, which is a collection of feathery fibers bursting from the enveloping capsule of the germ, and which proceeds immediately to extend itself vertically upwards.

P, Plumule.

Plurality (plö-ral'i-ti), in ecclesiastical law, signifies the holding by the same person of two or more benefices. Pluralities were forbidden by the canon law, but the bishops and the pope assumed the right of granting dispensations to hold them. They were prohibited by the Councils of Chalcedon (451), Nicæa (787), and Lateran (1215). In England pluralities in the church are forbidden excepting in particular cases, as, for instance, where two livings are within three miles of each other, and the value and population of each being small.

Plus (L., more), in mathematics, signifies addition; the sign by which it is indicated is +; thus A + B, which is read A *plus* B, denotes that the quantity A is to be added to the quantity B. Plus, or its sign +, is also used to indicate a positive magnitude or relation, in opposition to *minus* —, which indicates a negative.

Plush, a fabric similar to velvet, from which it differs only in the length and density of the nap. The nap may be formed either in the warp or woof, the one in which it is being double, there being a warp and a woof for the body of the cloth, and a warp or a woof for the nap. Plushes are now made almost exclusively of silk. The cheaper qualities have a cotton backing. Some of the finest dress plushes are produced in London, plushes for gentlemen's hats come chiefly from Lyons, while common or imitation plushes are largely manufactured in Germany. Plush is now also extensively used in upholstery and decorative work.

Plutarch (plö'tårk; Greek, PLOUTARCHOS), a learned Greek writer, born at Cheronæa in Bœotia, where he also died. Neither the year of his birth nor that of his death is accurately known, but it is generally held that he lived from the reign of Nero to that of Adrian (54–117 A.D.). He appears from his writings to have visited Italy, lectured there on philosophy, and stayed some time at Rome, where he established a school during the reign of Domitian. His *Parallel Lives of Illustrious Greeks and Romans* is the work to which he owes his fame. The lives are nearly all written in pairs, one Greek and one Roman, followed by a comparison of the two, and are models of biographical portraiture. We have numerous editions and translations of them. Plutarch's other works, about sixty in number, are generally classed as *Moralia*, though some of them are narrative. His writings show that he was well acquainted with the literature of his time, and with history, and that he must have had access to many books.

Pluto (plö'tō), in classical mythology, the god of the infernal regions, the ruler of the dead. He was a son of Cronus and Rhea, a brother of Zeus (Jupiter) and Poseidon (Neptune), and to him, on the partition of the world, fell the kingdom of the shades. He married Persephŏnē (which see). By the Greeks he was generally called Hades and by the Romans Orcus, Tartarus, and Dis Pater. As is the case with all other pagan deities, the accounts of Pluto vary with different writers and periods, and in later ages he was confounded with Plutus. The worship of Pluto was extensively spread among the Greeks and Romans. The cypress, the box, the narcissus, and the plant adiantum (maiden-hair) were sacred to him; oxen and goats were sacrificed to him in the shades of night, and his priests were crowned with cypress. He is represented in gloomy majesty, his forehead shaded by his hair, and with a thick beard. In his hand he holds a two-forked scepter, a staff, or a key; by his side is Cerberus. He is often accompanied by his wife.

Plutonic Rocks (plö-ton'ik), unstratified crystalline rocks, such as granites, greenstones, and others, of igneous origin, formed at great depths from the surface of the earth. They are distinguished from those called volcanic rocks, although they are both igneous; plutonic rocks having been elaborated in the deep recesses of the earth, while the volcanic are solidified at or near the surface.

Plutus (plö'tus), in Greek mythology, the god of riches. Zeus struck him blind because he confined his gifts to the good; and he thenceforth conferred them equally on the good and the bad. His residence was under the earth. Plutus is the subject of Aristophanes's comedy of the same name.

Pluviose (plö'vi-ōs), the fifth month of the French Republican calendar, extending from January 20 to February 18 or 19. See *Calendar*.

Plymouth (plim'uth), a seaport of England, in Devonshire, at the head of Plymouth Sound, between the estuaries of the Plym and Tamar. Taken in its largest sense, it comprehends what are called the 'Three Towns,' or Devonport on the west, Stonehouse in the center, and Plymouth proper on the east. Plymouth proper covers an area of about 1 square mile, the site being uneven and somewhat rugged, consisting of a central hollow and two considerable eminences, one on the north, forming the suburbs, and the other, called the Hoe, on the south, laid out as a promenade and recreation ground. The old Eddystone Lighthouse has been re-erected in Hoe Park, which also contains a handsome statue of Sir Francis Drake by Boehm. The top of the Hoe offers magnificent land and sea views. The older parts of the town consist of narrow and irregular streets devoid of architectural beauty, but the newer parts and suburbs display an abundance of elegant buildings. The guild-hall, a Gothic building, is the finest modern edifice (1870–74), and has

a tower nearly 200 feet high; among other buildings are St. Andrew's Church, the postoffice, the Royal Hotel, theater, and the athenæum. The citadel, an obsolete fortification built by Charles II, is another object of interest. Plymouth is well defended both land- and sea-wards by a series of forts of exceptional strength provided with heavy ordnance. Charitable and educational institutions abound; the latter include a marine biological laboratory. The manufactures are not very extensive, and chiefly connected with ships' stores; but the fisheries are valuable, and Plymouth has a large export and coasting trade. Its chief importance lies in its position as a naval station. Thanks to extensive and sheltered harbors, Plymouth rose from a mere fishing village to the rank of foremost port of England under Elizabeth, and is now as a naval port second only to Portsmouth. To secure safe anchorage in the Sound a stupendous breakwater has been constructed at a cost of about £2,000,000. The Western Harbor, or the Hamoaze (mouth of the Tamar), is specially devoted to the royal navy, and here (in Devonport, which see) are the dockyard, and Keyham steam-yard; the victualing yard, marine barracks, and naval hospital being in Stonehouse. The mercantile marine is accommodated in the Eastern Harbor, the Catwater (200 acres), or estuary of the Plym, and in Sutton Pool, and the Great Western Docks in Mill Bay. Plymouth is supplied with water from Dartmoor by a *leat* or channel constructed by Sir Francis Drake. Pop. (1911) 112,042.

Plymouth, a seaport of Massachusetts, the seat of Plymouth county, 37 miles S. S. E. of Boston. It is situated in a capacious but shallow bay, and has extensive fisheries, rope and canvas factories, also ironworks, cotton, woolen, and silk mills, nail, tack, and wire factories, etc. Plymouth is the oldest town in New England, the place where the Pilgrims landed from the *Mayflower* in 1620, 'Plymouth Rock' still marking the place of landing. Pilgrim Hall, and a colossal monument to the pilgrims, on the top of the adjoining hill, are the chief sights of the place. Pop. 12,141.

Plymouth, a town of Luzerne county, Pennsylvania, on the Susquehanna River, 4 miles below Wilkes-Barre. Coal-mining is extensively carried on, and there are hosiery mills, and manufactures of mining drills, miners' squibs, etc. Pop. 16,996.

Plymouth a town (township) in Litchfield county, Connecticut. It has various manufactures, including saw-mills, granite works, etc. Pop. 5021.

Plymouth Brethren, Plymouthites, a sect of Christians who first appeared at Plymouth, England, in 1830, but have since considerably extended over Great Britain, the United States, and among the Protestants of France, Switzerland, Italy, etc. They object to national churches as being too lax, and to dissenting churches as too sectarian, recognizing all as brethren who believe in Christ and the Holy Spirit as his Vicar. They acknowledge no form of church government nor any office of the ministry, all males being regarded by them as equally entitled to 'prophesy' or preach. At first they were also called Darbyites, after Mr. Darby, originally a barrister, subsequently a clergyman of the Church of England, to whose efforts their origin and the diffusion of their principles are much to be ascribed. The Plymouth Brethren professedly model themselves upon the primitive church,

and at an early stage of the movement there was a tendency towards the adoption of the principle of community of goods. They also, in general, hold millennarian views, and Darby is exceedingly minute in carrying out the allegorical interpretation of the ceremonial and other figurative parts of the Old Testament. The interpretation of prophecy, as filling up in detail the entire rôle of history, is a feature of the views of Darby and the Plymouthists. They baptize adults and administer the sacrament, which each takes for himself, each Sunday. At their meetings a pause of unbroken silence ensues when no one is moved to speak. They hold both civil governments and ecclesiastical organizations to be under divine reprobation, the former as atheistic, the latter as in a state of apostasy. Theological differences early caused a split among the Plymouthists, and already during the lifetime of Darby there were three distinct divisions.

Plymouth Sound, an arm of the sea, on the southwest coast of England, between the counties of Devon and Cornwall. It is about 3 miles wide at its entrance, bounded by elevated land, which descends abruptly to the sea. It contains Drake Island, which is fortified, and the celebrated Plymouth Breakwater. See *Plymouth*.

Pneumatic Dispatch (nū′mat-ik), propulsion by means of compressed air or by forming a vacuum. Pneumatic railways have thus far proved abortive (see *Atmospheric Railway*), but propulsion by compressed air has of recent years been successfully applied to a variety of practical uses. Parcels are thus conveyed, and internal communication in warehouses, hotels, etc., is carried on by its means. The most developed application of compressed air as a motive force is in connection with the postal and telegraph service of large cities. Pneumatic dispatch, which has proved a most useful auxiliary in securing prompt and cheap collection and distribution of telegraphic messages, was first introduced in London by Latimer Clark in 1853, improved by Varley in 1858, and again by Siemens in 1863. The vehicles charged with the messages, technically called *carriers*, are forced through leaden tubes connecting the various stations, and from 1½ to 3 in. diameter, by means of air-pressure at one end, or sucked through by a partial vacuum at the other. Mail matter is dispatched in this way from the main postoffice to the substations of our larger cities, as New York, Philadelphia and Chicago, and aids greatly in promptitude of service.

Pneumatic Gun, a gun which derives its power from compressed air. It is fired by pulling a lanyard, which releases the air.

Pneumatics, that branch of physics which treats of the mechanical properties of elastic fluids, and particularly of atmospheric air. The chemical properties of elastic fluids (air and gases) belong to chemistry. Pneumatics treats of the weight, pressure, equilibrium, elasticity, density, condensation, rarefaction, resistance, motion, etc., of air; it treats also of air considered as the medium of sound (acoustics), and as the vehicle of heat, moisture, etc. It also comprehends the description of those machines which depend chiefly for their action on the pressure and elasticity of air, as the various kinds of pumps, artificial fountains, etc. The weight of the air, and its pressure on all the bodies on the earth's surface, were quite unknown to the ancients, and only first perceived in the middle of the seventeenth century by Galileo, when a sucking-pump refused to draw water above a certain height; and to Torricelli, his pupil, belongs the honor of giving first a natural explanation of the phenomenon. See *Air*, *Air-pump*, *Atmosphere*, *Barometer*, *Gas*, *Pump*, etc.

Pneumonia (nū-mō′ni-a; Greek, *pneumōn*, lung), acute inflammation of the lung substance. The more general symptoms are feverishness, constant pressing pain on the chest, difficult breathing, and painful cough. The base of the lung is generally attacked, and the right lung twice as often as the left, but both may be affected. Pneumonia is frequently complicated with pleurisy (which see). The patient must be kept quiet in bed, the affected parts poulticed, and the bowels attended to. Mild, nourishing diet, with medicines to stimulate the skin and to reduce fever, should be given.

Pnom-penh (p'num pen′), the chief town of Cambodia, at the apex of the delta of the Mekong. Pop. about 60,000.

Po (pō; anciently *Padus* or *Eridănus*), the largest river of Italy. It rises on the confines of France and Piedmont in Mount Viso, one of the Cottian Alps, and receives during its long course to the Adriatic (about 450 miles) a large number of tributary streams. It divides the great plain of Lombardy into two nearly equal parts, and is the grand receptacle for the streams flowing south from the Alps, and for the lesser waters that flow north from a part of the Apennine range. Its principal affluents are, on the left, the

Baltea, Sesia, Ticino, Adda and Mincio; on the right, the Tanaro, Trebbia and Panaro. The Po, in spite of embankments, etc., is the cause of frequent inundations, especially near its mouth. In some places, owing to the silt carried down, its channel is now raised above the country through which it flows. Fish are plentiful in it, including the shad, salmon, and even sturgeon.

Poa. See *Meadow-grass.*

Poaching (pōch'ing), the trespassing on another's property for the purpose of killing or stealing game or fish. For the law relating to the poaching of game see *Game Laws.* According to the law of England, when a person's land adjoins a stream where there is no ebb and flow that person is assumed to have an exclusive right to fish in the stream as far as his land extends, and up to the middle of the stream; and so also when a person's land incloses a pond, the fish in that pond belong to him. Where several properties are contiguous to the same lake the right of fishing in that lake belongs to the proprietors, in proportion to the value of their respective titles. Exclusive right of fishing in a public river, that is, one in which there is ebb and flow up to the tidal limit, or a portion of the sea, is held by some proprietors by virtue of royal franchises granted prior to the Magna Charta. Any person, not an angler, found fish-poaching on private property is liable to a maximum fine of £5, in addition to the value of the fish; an angler's fine does not exceed £2. If the act is committed on land belonging to the dwelling-house of the owner it becomes a misdemeanor, and such a fish-poacher, when caught in the act, may be arrested by anybody. Anglers cannot be arrested, even in the latter case, but the penalty extends to £5. The owner or his servant may deprive the angler of his fishing gear in lieu of a fine. The same law applies also to Ireland. In Scotland, as a general rule, the right of catching fish other than salmon belongs to the owner of the land on the banks of the waters. As to property in salmon fishings, that is held to be originally vested in the crown, not only for the rivers of Scotland but also for the coasts, and no person, accordingly, is allowed to fish for salmon unless he possesses a grant or charter from the crown enabling him to do so. The fact is, however, that nearly all the chief landed proprietors do possess such rights. The punishment for poaching salmon in Scotland is a fine not less than 10*s.* nor more than £5, together with the forefeiture of the fish taken, and the boat, tackle, etc., employed by the poacher, if the sheriff or justice think fit. Anyone not an angler poaching trout or any other fresh-water fish renders himself liable to a penalty of £5, besides forfeiting the fish caught. If he be caught in the act of using a net for poaching such fish he may be arrested, but not unless; but even when he may not be arrested his boat and fishing implements may be seized. A person who merely angles for trout in places where he has not got leave to fish is only liable to an action at law. Poaching in the British islands was formerly much more severely punished than at the present day. In the United States game laws are of comparatively recent adoption and fishing and hunting are largely free.

Pocahontas (pō-ka-hon'tas), daughter of Powhatan, a celebrated American-Indian warrior of Virginia, born about the year 1595. Some romantic incidents are told of her life, but there seem to be considerable doubts as to their truth. She is said to have shown a great friendship for the English who colonized Virginia, and to have rendered them substantial services. In 1607 she prevailed on her father to spare the life of Captain John Smith, his prisoner, and two years later frustrated a plot to destroy him and his party. After Captain Smith had left the colony she was kept as a hostage by an English expeditionary force (1612). During this detention she married Mr. Rolfe, an Englishman, who in 1616 took her on a visit to England, where she was baptized and assumed the name of Rebecca. She died the following year, and left one son, who was educated in London, and whose descendants are said to exist still in the State of Virginia.

Pocatello (pō-ka-tel'o), a city, capital of Bannock Co., Idaho, 134 miles N. by W. of Ogden, Utah. It has large railroad shops and other industries, and is the seat of the Academy of Idaho. Pop. 9110.

Pochard (pō'chard; *Fuligŭla*), a subfamily of Anatidæ or ducks, inhabiting the Arctic regions. They migrate southwards in winter to the coasts of Europe and North America; and they even occur in Asia and in the southern hemisphere. They are marine in habits, and feed upon crustaceans, worms, molluscs, and aquatic plants. There are numerous species, and the flesh of several is much prized as food. A typical form and one of the best known is the *F. ferīna*, the common pochard, variously called dunbird, red-headed

poker, red-headed widgeon or duck. The head and neck are bright chestnut; eyes red; bill long; a broad, transverse, and dark-blue band on the upper mandible; length 16 to 17 inches; weight 1 to 2 lbs. Other familiar varieties are the *F. glaciālis*, or long-tailed duck; the scaup pochard (*F. marīla*); the tufted pochard (*F. cristāta*); and the canvas-backed duck of North America (*F. Valisneria*), so highly esteemed by epicures.

Poco (pō'kō; Italian for 'a little'), a term used in music in such phrases as *poco forte* (*p. f.*), rather loud; *poco animato*, with some animation; and so forth.

Pocock (pō'kok), Edward, an English oriental scholar, born at Oxford in 1604; died in 1691. He was graduated from Oxford, and was ordained priest in 1628. While at the university he acquired a taste for oriental literature, which he was able to gratify as chaplain to the English factory at Aleppo, 1629-36. Laud engaged him to collect manuscripts and coins for the University of Oxford, and in 1636 chose him to fill the newly-founded Arabic professorship at that university. The years between 1637 and 40 he spent at Constantinople studying and collecting Arabic manuscripts. Although a man of moderate views in church and state matters, he suffered from the troubles of his times. He was appointed to the Hebrew chair at Oxford in 1648, together with the rich canonry of Christ Church; but from 1650-60 he was deprived of his church preferment. His works are of great value to oriental and biblical students.

Pod, in botany, a general term applied to various forms of seed-vessels of plants, such as the legume, the loment, the siliqua, the silicle, the follicle, the capsule, etc.

Podagra (po-dag'ra), that species of gout which recurs at regular intervals, generally in spring or autumn, attacking the joints of the foot, particularly of the great toe, attended with a sharp, burning pain, and rendering the whole foot so sensitive that the slightest pressure, or even the agitation occasioned by a strong draught of air, causes torture. The pain can be assuaged by reducing the inflammation, promoting the secretion of the gouty matter, and by suitable diet and mode of living. See *Gout.*

Podargus (po-dar'gus), a genus of Australasian nocturnal birds of the goatsucker family. Like the goatsuckers, their mouths have a very wide gape. By day they are excessively drowsy. There are several species, one of which, Cuvier's podargus (*P. Cuvieri*), is known among the Australian settlers by the name of 'more pork' from its strange cry.

Podestà (pō-des'ta), an Italian word derived from the Latin *potestas*, power, equivalent in its original meaning to a holder of power or authority. In the middle ages the podestà wielded almost dictatorial power in many of the Italian cities. In the modern kingdom of Italy he is the chief official of a commune, corresponding to the French *maire.*

Podgoritza (pod'gō-rē-tza), formerly a Turkish stronghold against Montenegro, but incorporated with that principality since 1880. It lies about 35 miles north of Scutari, at the foot of a range of mountains. Pop. 7000.

Podiceps. See *Grebe.*

Podiebrad (pod'ye-brâd), George, King of Bohemia, born in 1420 of a noble family; died in 1471. When a mere youth he entered into the Hussite movement. In the war against Albert V of Austria he rendered eminent services, and secured the highest esteem of the Calixtines or Utraquists. In 1444 he was chosen head of the party, became one of the two governors of Bohemia during the minority of Ladislas, Albert's posthumous son, then king of the country, and, after overcoming the Catholic opposition, sole regent in 1451. Ladislas died in 1457, and Podiebrad was elected to the throne in the following year, and crowned by the Catholic bishops in 1459. He inaugurated his reign by the introduction of various beneficent laws, wise administration, and a policy of conciliation towards the Catholics; but he was not allowed to carry out his reforms in peace. The pope, Paul II, publicly denounced him as a heretic in 1463, excommunicated him, and his legate soon produced a rising among the Catholics. A German crusade was formed against Bohemia in 1466, but the invaders were defeated in several places. Matthias Corvinus, king of Hungary and son-in-law of Podiebrad, at the instigation of the pope and the Emperor Frederick invaded Moravia; but Podiebrad's generalship was again successful, and in 1469 he hemmed in the Hungarian army at Willemow. In order to secure the aid of the Poles he assembled a diet at Prague, and declared the successor to the throne of Poland to be his own successor, while his sons should only inherit the family estates (1469). The Poles were thus immediately drawn to his side; the

Emperor Frederick also declared in his favor; and his Catholic subjects became reconciled to him. Shortly after he destroyed the infantry of the Hungarians, which had again taken the field, and Matthias Corvinus hastily fled with his cavalry. He thus saw himself at last completely secured in his kingdom; but no sooner was this accomplished than he died; being succeeded by Ladislas, eldest son of Casimir IV, king of Poland, who thus united the two crowns.

Podium (pō'di-um), in architecture, a long pedestal supporting a series of columns. It is called a *stylobate* when the columns stand on projecting parts of it.

Podolia (po-dō'li-a), a government of Southwestern Russia; area, 16,224 sq. miles. The country is mostly flat, but a low branch of the Carpathians extends through it in an easterly direction. The principal rivers are the Dniester and the Bug. The climate is temperate and salubrious, the soil generally very fertile; in fact, Podolia forms one of the most valuable agricultural possessions of the Russian Empire. Manufactures are spreading rapidly, and beet-sugar, spirits, flour and tobacco are produced in great quantities. The trade with Germany, Austria and Odessa is extensive. Capital, Kamenetz. Pop. 3,543,700.

Podophthalmata (po-dof-thal'ma-ta; 'stalk-eyed'), a division of the Crustacean class, primarily distinguished by compound eyes supported upon movable stalks termed *peduncles*. This division includes the orders Stomapoda and Decapoda, the former of which is represented by the 'locust,' 'glass' and 'opossum' shrimps, while the latter includes the familiar crabs, lobsters, common shrimps, hermit crabs, and their allies. See also *Crustacea*, *Crab*, *Lobster*, *Shrimp*, etc.

Podophyllin (pod-ō-fil'in), a resin obtained from the root-stock of the May apple (*Podophyllum peltatum*. See *May apple*). It is of a brownish-yellow color, dissolves readily in alcohol, and has been admitted to the pharmacopœias of many countries as a purgative; it is particularly beneficial in cases of sluggish liver, having much the same effect as mercury, but in some constitutions produces severe griping.

Poduridæ (po-dū'ri-dē), a family of apterous (wingless) insects belonging to the order Thysanura, distinguished by the possession of an elastic forked caudal appendage, which is folded under the body when at rest, and by the sudden extension of which they are enabled to effect considerable leaps; hence their popular name of springtails. Their scales are favorite test objects for microscopes.

Poe (pō), Edgar Allan, poet and romantic writer, born at Boston, Massachusetts, in 1809; died at Baltimore in 1849. His father and mother were actors, and being left an orphan when a mere child he was adopted by Mr. Allan, a wealthy Richmond merchant. His early education he received at Stoke-Newington, London, 1816-21, and on his return to America attended a school at Richmond, Virginia, and finally entered the University of Charlottesville. Here he displayed extraordinary talents, but also contracted a taste for fast living which occasioned quarrels with his benefactor, and caused him to quit America for Europe. He took part in the struggles of the Greeks for independence, and for a few years led an erratic life on the continent. In 1829 he returned to America, a reconciliation with Mr. Allan took place, and he was sent as cadet to the military academy at West Point. Further irregularities brought about a complete rupture with Mr. Allan, and Poe enlisted as a private soldier, however only to desert later on. His literary career may be said to have begun in 1835, when he gained the prize offered by the Baltimore *Saturday Visitor* for a tale and a poem. He then became successively editor of the newly-founded *Southern Literary Messenger* at Richmond, contributor to the *New York Review* at New York, and editor of *Burton's Gentleman's Magazine* and *Graham's Magazine* at Philadelphia. For these periodicals he wrote a number of tales, exhibiting a weird yet fascinating imagination. He also added to his reputation by poems of striking originality and rhythmic power. While at Richmond, in 1836, he married his cousin, Virginia Clemm, a beautiful and amiable girl. The great event in Poe's life was the publication at New York in 1845 of his poem, *The Raven*, which spread his fame to the whole English-speaking world. For this remarkable production Poe is said to have received $10. He was subsequently connected with *The Home Journal* and *The Broadway Journal*. In 1848 his wife died. Passing through Baltimore in 1849, on his way to New York to make preparation for a second marriage, he was led to excessive drinking, and died from its effects at the hospital. Poe's career is sad enough, and his faults were sufficiently numerous, but until John H. Ingram in 1874 published a biography of him, based on documents and ascer-

Copyright, 1898, by A. W. Elson & Co.

THE POETS' CORNER, WESTMINSTER ABBEY, LONDON

tained facts, the public were generally led to believe by Rufus Griswold, his first biographer, that his character was very much blacker than it really seems to have been. He has won an enduring reputation alike for his weird and striking tales and his rare and musical poems, while as a critic he also showed fine taste and judgment. Many regard him as the most original genius America has produced.

Poe-bird. See *Honey-eater.*

Poelenburgh (pö′len-bu̇r*h*), CORNELIS VAN, a Dutch painter, born at Utrecht in 1586, became a pupil of Bloemaart, and afterwards went to Italy. In 1627 he returned to Utrecht, where he died in 1667. He confined himself principally to small landscapes, in which he excelled. Charles I invited him to England, where he painted a portrait of the king and other works. His works are rare, and esteemed for delicacy of touch and beauty of coloring.

Poerio (po-ā′re-ō), CARLO, an Italian statesman, born at Naples in 1803; died at Florence in 1867. Like his father Giuseppe Poerio, he often opposed the actions of the Bourbon kings of Naples, and frequently devoted his talents as an advocate to the cause of political offenders. He thus became a suspect, and from 1837-48 suffered various terms of imprisonment. The revolution of the latter year released him from prison and placed him at the head of the Neapolitan police, and of the ministry of public instruction, but, finding it impossible to get the Bourbons to fulfill their promises, he resigned. He sat in the new parliament and acted with the opposition. In July, 1849, he was arrested and condemned without defense to twenty-four years' imprisonment. The barbarous treatment he received in prison gave occasion to Gladstone's famous *Two Letters* to Lord Aberdeen, written in 1851 from Naples. In 1859 his sentence was commuted to transportation to South America; but he and his companions in misfortune effected a landing at Cork in Ireland, and thence proceeded to London. In 1861 he was elected vice-president of the Italian chamber of deputies, and remained till his death one of the chiefs of the constitutional liberal party.

Poet Laureate. See *Laureate.*

Poetry (pō′et-ri; from *poet*, the Greek *poiētēs*, a maker or creator), that one of the fine arts which exhibits its special character and powers by means of language; or, according to Aytoun, the art which has for its object the creation of intellectual pleasures by means of imaginative and passionate language, and of language generally, though not necessarily, formed into regular numbers. It has also been defined as the concrete and artistic expression of the human mind in emotional and rhythmical language. It is the earliest form of literature, and also the final and ideal form of all pure literature; its true place lying between music, on the one hand, and prose or loosened speech on the other. The poet deals with language as the painter does with color, sometimes invading the domain of music and sometimes that of prose, or rather he brings prose into the domain of poetry. The two great classes of poetic impulse are dramatic imagination and lyric imagination. Partaking of the character of both is epic or narrative poetry. (See *Epic.*) To the dramatic class belong tragedy and comedy; to the lyric belong the song, hymn, ode, anthem, elegy, sonnet and ballad, though the last-named frequently has a kind of epic character. Other forms, such as 'didactic' poetry, 'satirical' poetry, are also in use, but it is a question if they enter into the circle of poetry at all. (See separate articles on the various species.) *Poetics* is the theory of poetry; that branch of criticism which treats of the nature and laws of poetry.

Pogge. Same as *Menhaden* (which see).

Poggio Bracciolini (pod′jō brȧt-chō-lē′ni), an Italian scholar and prolific writer, born in 1380; died in 1459. He came early under the influence of the revival of literature kindled in Italy by Petrarch and Boccaccio. About 1402 he became writer of the apostolic letters under Boniface IX, and for fifty years remained connected with the papal curia. His writings embrace a variety of subjects.

Poincaré (pwan-kȧ-rā′), HENRI, French mathematician and physicist, born at Nancy in 1854; died in 1912. He was professor at the University of Paris and made original contributions in pure mathematics, in celestial mechanics, and in the mathematics of physics. He has been called the greatest mathematician since Archimedes.

Point, in geometry, is a quantity which has no parts, or which is indivisible, or which has position without magnitude. Points may be regarded as the ends or extremities of lines. If a point is supposed to be moved in any way, it will by its motion describe a line.

Pointe-à-pitre (pwânt-à-pē-tr), the principal port of the French W. Indian island Guadeloupe, on the southwest coast of Grande Terre, and one of the most important commercial towns of the Antilles. The town, mostly built of wood, was destroyed by fire in 1780, by an earthquake in 1843, and again by fire in 1871. Pop. 16,506.

Pointed Architecture, a name for Gothic (which see).

Pointer Dog (poin'tėr), a breed of sporting dogs, nearly allied to the true hounds. The original breed is Spanish, but a cross with the foxhound is now generally used. It is smooth, short-haired, generally marked black and white like the foxhound, but occasionally a uniform black. It derives its name from its habit of stopping and pointing with the head in the direction of game, discovered by a very acute sense of smell. The dog once having pointed remains perfectly quiet. This faculty in the pointer is hereditary, but is better developed by training.

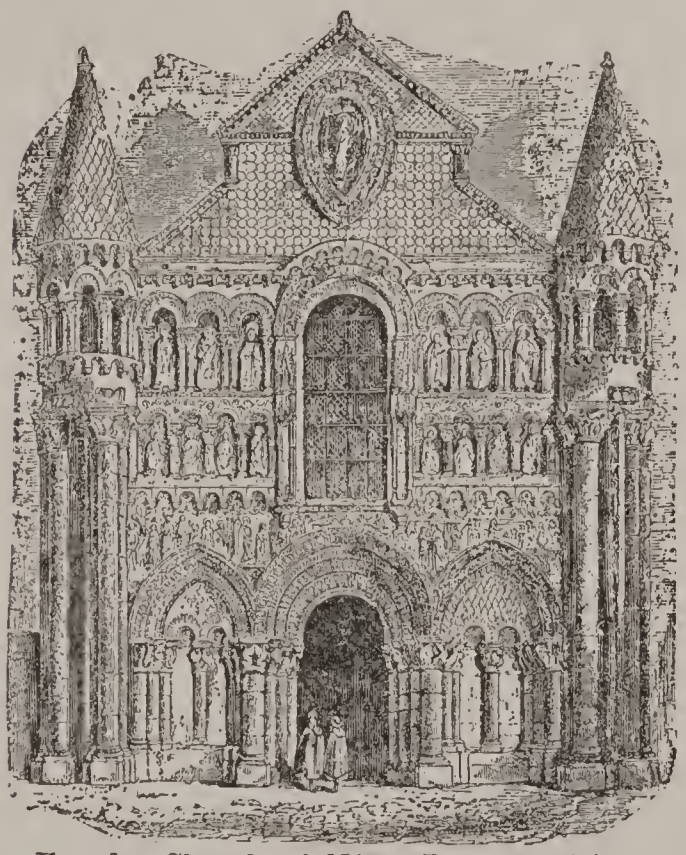
Poison (poi'zn), any agent capable of producing a morbid, noxious, dangerous, or deadly effect upon the animal economy, when introduced either by cutaneous absorption, respiration, or the digestive canal. Poisons are divided, with respect to the kingdom to which they belong, into animal, vegetable, and mineral; but those which proceed from animals are often called *venoms*, while those that are produced by disease have the name *virus*. With respect to their effects they have been divided into four classes, namely, irritant, narcotic, narcotico-acrid, and septic or putrescent. Many poisons operate chemically, corroding the organized fiber, and causing inflammation and mortification. To this class belong many metallic oxides and salts, as arsenic, one of the most deadly poisons; many preparations of copper, mercury; antimony, and other metals; the mineral and vegetable acids; the substance derived from some plants, as the spurges and mezereon; and cantharides, from the animal kingdom. Other poisons exercise a powerful action upon the nerves and a rapid destruction of their energy. These are the sedative or stupefying poisons, and belong for the most part to the vegetable kingdom. Opium, hemlock, henbane, belladonna, are the best-known forms of this poison. Prussic acid, a poison obtained from the kernels of several fruits, the cherry-laurel, etc., is one of the most rapid destroyers of life. Among plants there are many which unite the properties of both kinds, as the common foxglove, and the monkshood or aconite. An alkaloid is extracted from the latter, $\frac{1}{16}$th of a grain of which has proved fatal. Another class of poisons suddenly and entirely cause a cessation of some function necessary to life. To this class belong all the kinds of gas and air which are irrespirable, suffocating vapors, as carbonic acid gas, fumes of sulphur and charcoal, etc. Many preparations of lead, as acetate or sugar of lead, carbonate or white lead, etc., are to be counted in this class. The effects of poisons materially depend on the extent of the dose, some of the most deadly poisons being useful remedies in certain quantities and circumstances. Antidotes naturally vary with the different kinds of poisons. They sometimes protect the body against the operation of the poison, sometimes change this last in such a manner that it loses its injurious properties, and sometimes remove or remedy its violent results. Thus in cases of poisoning by acrid and corrosive substances we use the fatty, mucilaginous substances, as oil, milk, etc., which sheathe and protect the coats of the stomach and bowels against the operation of the poison. Against the metallic poisons substances are employed which form with the poison insoluble compounds, such as freshly prepared hydrated oxide of iron, or dialyzed iron for arsenic, albumin (white of egg) for mercury; Epsom or Glauber's salts for lead. Lime, chalk, baking soda, and magnesia are the best remedies for the powerful acids. For cantharides, mucilage, gruel, and barley-water are employed. We oppose to the alkaline poisons the weaker vegetable acids, as vinegar. Prussic acid is neutralized by alkalies and freshly precipitated oxide of iron. To arouse those poisoned by opium, we use coffee and ammonia, and belladonna as an antagonistic drug, the person being kept walking. Chloral-hydrate poisoning is similarly treated by the drug mentioned; and for strychnia or nux vomica, animal charcoal in water and chloral-hydrate are used. Poisoning was a common crime in ancient Rome, and in France and Italy during the seventeenth century. See *Aqua Tofana*, *Brinvilliers*.

Poison Ivy, or Poison Oak (*Rhus toxicodendron*), a species of sumach which bears three leaflets and usually has the climbing habit. It is very irritating to sensitive skins, producing an itching eruption which is highly annoying. Another species, *Rhus venenata*, the Poison-ash, Poison-elder, or Poison-sumach, is still more poisonous.

It is a handsome tree, but fortunately is largely confined to marshes.

Poison-nut, a name for *Strychnos nux-vomica*, an evergreen tree of the nat. order Loganiaceæ, the seeds of which yield strychnine. (See *Nux vomica.*) Also a name for the *Tanghinia venenifera*, of the nat. order Apocynaceæ, the fruit of which is a drupe enclosing a kernel extremely poisonous. It used to be employed in Madagascar as an ordeal-test of guilt or innocence, the result generally being the death of the suspected person.

Poitiers (pwâ-tyā), or POICTIERS, a town of France, on the Clain, formerly capital of the province of Poitou, at present of the department of the Vienne. The town occupies a large space, the houses being often surrounded by gardens and orchards; the streets are narrow and ill paved. The principal edifice is the cathedral, founded by Henry II of England about 1162. Poitiers is one of the most ancient towns



Façade, Church of Nôtre Dame, Poitiers.

of France, and the vestiges of a Roman palace, of Roman baths, of an aqueduct, and an amphitheater still remain. Two famous battles were fought in its vicinity, that in which Charles Martel defeated the Saracen army in 732, and that between the French under their king John II and the English under Edward the Black Prince in 1356. The manufactures are unimportant, but there is a large trade. Pop. (1906) 31,785.

Poitiers, DIANA OF. See *Diana of Poitiers.*

Poitou (pwâ-tö), one of the old provinces of France, between Brittany and Anjou on the north, Berry on the east, the Atlantic on the west, and Angoumois and Saintonge on the south. The departments of Vienne, Deux-Sèvres and Vendée have been formed out of this province. Henry II of England acquired possession of Poitou by his marriage with Eleanor, heiress of the last Duke of Aquitaine. Philip Augustus conquered it.

Poker (pō′kėr), an American game of cards for two or more persons, originally played with only twenty cards, all below the tens being excluded, but now played with the full pack. It is a popular gambling game, the mode of playing being to bet on the comparative strength of the cards held by the players.

Pokeweed (pōk′wēd), the *Phytolacca decandra*, a North American branching herbaceous plant, nat. order Phytolaccaceæ, which is naturalized in some parts of Europe and Asia. Its root acts as a powerful emetic and cathartic, but its use is attended with narcotic effects. Its berries are said to possess the same quality; they are employed as a remedy for chronic and syphilitic rheumatism, and for allaying syphiloid pains. The leaves are extremely acrid, but the young shoots, which lose this quality by boiling in water, are eaten in the United States as a substitute for asparagus.

Pola (pō′la), a town on the Adriatic, the principal naval port of Austria-Hungary, 55 miles south of Trieste. It is an ancient place, and was for a lengthened period the principal town of Istria. Its former importance is well attested by architectural remains, chief among which are a colossal and well-preserved amphitheater and two temples. Pola had sunk to the level of a mere fishing-place with some 800 or 900 inhabitants, when the Austrian government, tempted by excellent harbor accommodation, selected it as its chief naval station; and by the erection of dockyards, of an arsenal, barracks, and other government establishments, infused new life into it. The entrance to the harbor is narrow, but the water is deep, and within it expands into a large basin, landlocked and safe. Forts and batteries on hills forming the background protect the harbor. Pop., including garrison, 45,052.

Polacca (pō-lak′a), or POLACRE, a three-masted vessel used in the Mediterranean. The masts are usually of one piece, so that they have

neither tops, caps, nor crosstrees. It carries a fore-and-aft sail on the mizzen-mast, and square sails on the mainmast and foremast.

Polacca. See *Polonaise.*

Poland (pō'land), an extensive territory of Central Europe, which existed for many centuries as an independent and powerful state; but having fallen a prey to internal dissensions, was violently seized by Austria, Prussia and Russia as a common spoil, partitioned among these three powers, and incorporated with their dominions. In its greatest prosperity it had at least 11,000,000 inhabitants, and an area of 350,000 square miles, and immediately before its first partition had an area of about 282,000 square miles, stretching from the frontiers of Hungary and Turkey to the Baltic, and from Germany far east into Russia, forming one compact kingdom. With the exception of the Carpathians, forming its southwestern boundary, and a ridge of moderate elevation penetrating into it from Silesia, the country presents the appearance of an almost unbroken plain, composed partly of gently-undulating expanses, partly of rich alluvial flats, partly of sandy tracts, and partly of extensive morasses. Its principal streams are the Vistula, the Niemen and the Dwina, all belonging to the basin of the Baltic; and the Dniester, South Bug and Dnieper, with its tributary, Pripet, belonging to the basin of the Black Sea. The physical configuration of the country makes it admirably adapted for agriculture. Next to grain and cattle its most important product is timber.

The Poles, like the Russians, are a Slavonic race, and are first spoken of as the Polani, a tribe or people between the Vistula and Oder. The country was divided into small communities until the reign of Mieczyslaw I (962-992) of the Piast dynasty, who renounced paganism in favor of Christianity, and was a vassal of the German emperor. He was succeeded by Boleslaw the Great (992-1025), who raised Poland into an independent kingdom and increased its territories. In succeeding reigns the country was involved in war with Germany, the heathen Prussians, the Teutonic knights, and with Russia. The last of the Piast dynasty was Casimir the Great (1364-70), during whose reign the material prosperity of Poland greatly increased. He was succeeded by his nephew, Louis of Anjou, king of Hungary, whose daughter, Hedwig, was recognized as 'king' in 1384, and having married Jagello, prince of Lithuania, thus established the dynasty of the Jagellons, which lasted from 1386 to 1572. During this period Poland attained its most powerful and flourishing condition. In 1572 the Jagellon dynasty became extinct in the male line, and the monarchy, hitherto elective in theory, now became so in fact. The more important of the elective kings were Sigismund III (1587-1637), Wladislaw or Ladislaus IV (1632-48), John Casimir (1648-69), and the Polish general Sobieski, who became king under the title of John III (1674-96). He was succeeded by Augustus II, Elector of Saxony, who got entangled in the war of Russia with Charles XII, and had as a rival in the kingdom Stanislaus Lesczynski. Augustus III (1733-63) followed, and by the end of his reign internal dissensions and other causes had brought the country into a state of helplessness. In 1772, under the last feeble king, Stanislaus Augustus (1764-95), the first actual partition of Poland took place, when about a third of its territories were seized by Prussia, Austria and Russia, the respective shares of the spoil being Prussia 13,415 square miles, Austria 27,000 square miles, and Russia 42,000 square miles. What remained to Poland was completely under Russian influence. Another partition in 1793 gave Russia nearly 97,000 square miles and Prussia 22,500 square miles. A third partition took place in 1795 after the heroic attempt of Kosciusko to save his country, and the last king of Poland became a pensionary of the Russian court. The successive partitions gave Russia upwards of 180,000 square miles, Austria about 45,000 square miles, and Prussia 57,000 square miles. From 1815 to 1830 Russian Poland was a constitutional monarchy with the emperor as king, but the Poles, taking occasion of the French revolution, at the latter date rashly engaged in an insurrection, which only hastened their complete absorption in Russia. The name Kingdom of Poland indeed remains, but all the autonomic institutions of the country have been swept away, and the whole country is being rapidly Russified. The Polish language has been entirely superseded by Russian in all courts of law, educational establishments, and public offices; and all official correspondence must be in Russian. The population in 1897 was 9,455,943, of whom nearly three-fourths were Roman Catholics.

The Polish language belongs to the Slavic division of the Aryan or Indo-European tongues. It is remarkable for its flexibility, richness, power, and harmony; its grammatical structure is

fully developed and established, and its orthography is precise. The Polish literature reaches back to a more remote period than that of any other Slavonic language except the Bohemian. The oldest monuments consist of warlike, historical, political and religious poems, more especially the last; but the Latin language, fostered by the church, was used exclusively by Polish writers for several centuries. The 'golden age' of Polish literature was from 1521 to 1621. To this period belong Nicolas Rej (died 1568) and Jan Kochanowski (died 1584), who both attained eminence as poets, the former in satire, allegory, didactic poetry, etc., the latter as a lyrist of the highest rank. Among the other poets of the century were Szarzynski (died 1581), and Szymonowicz (Simonides), author of *Polish Idylls*. It was in the sixteenth century also that the first histories in the language of the people were written. This flourishing period of Polish literature was followed by a period of Jesuit supremacy and literary decline, which lasted till about the middle of the eighteenth century. About that time the influence of the French civilization was widely felt in Poland, and prepared the way for the revival of letters. The most distinguished authors of the latter part of the eighteenth century are Naruszewicz, who wrote odes, idylls, satires, etc., and Krasicki (1734-1801), who also distinguished himself in various fields. Among modern Polish poets may be noted Michiewicz (1798-1855), Krasinski (1812-59), Slowacki (1809-49), Zaleski (1802-86). Kraszewski, novelist and political and historical writer, is one of the most prolific of present-day Polish authors. Most departments of literature have been successfully cultivated by modern Polish writers, but comparatively few have attained a European reputation.

Polar Bear. See *Bear.*

Polar Circles, two imaginary circles of the earth parallel to the equator, the one north and the other south, distant 23° 28′ from either pole. See under *Arctic.*

Polar Coördinates. See *Coördinates.*

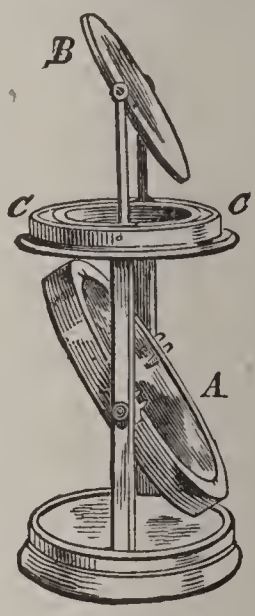
Polar Distance, the angular distance of any point on a sphere from one of its poles; more especially the angular distance of a heavenly body from the elevated pole of the heavens. It is measured by the intercepted arc of the circle passing through it and through the pole, or by the corresponding angle at the center of the sphere. According as the north or south pole is elevated we have the *north polar distance* or the *south polar distance.*

Polar Expeditions. See *North Polar Expeditions* and *South Polar Expeditions.*

Polar Forces, in physics, forces that are developed and act in pairs with opposite tendencies, as in magnetism, electricity, etc.

Polaris (pō-lar′is), the pole-star, which see.

Polariscope (pō-lar′is-kop), an optical instrument, various kinds of which have been contrived, for exhibiting the polarization of light, or for examining transparent media for the purpose of determining their polarizing power. The important portions of the instrument are the polarizing and analyzing plates or prisms, and these are formed either of natural crystalline structures, such as Iceland spar and tourmaline, or of a series of reflecting surfaces, artificially joined together. The accompanying figure shows Malus' polariscope. A and B are the reflectors, the one serving as polarizer, the other as analyzer, each consisting of a pile of glass plates. Each reflector can be turned about a horizontal axis, and the upper one, or analyzer, can also be turned about on a vertical axis, the amount of rotation being measured on the horizontal circle C C. See *Polarization of Light.*

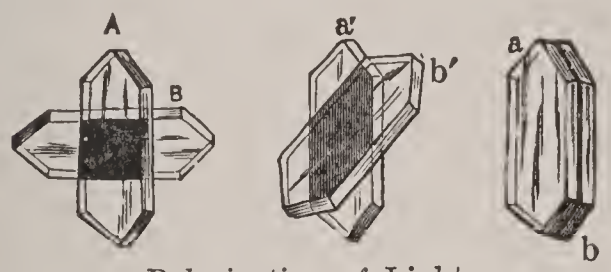


Polariscope.

Polarity (pō-lar′i-ti), that quality of a body in virtue of which peculiar properties reside in certain points called poles; usually, as in electrified or magnetized bodies, properties of attraction or repulsion, or the power of taking a certain direction; as, the *polarity* of the magnet or magnetic needle, whose pole is not that of the earth, but a point in the polar regions. A mineral is said to possess *polarity* when it attracts one pole of a magnetic needle and repels the other.

Polarization of Light, an alteration produced upon light by the action of certain bodies by which it is made to change its character. A common ray of light exhibits the same properties on all sides, but any reflected or refracted ray, or a ray transmitted through certain media, exhibits different properties on different

sides, and is said to be polarized. The polarization of light may be effected in various ways, but chiefly in the following: — (1) By reflection at a proper angle (the 'polarizing angle') from the surfaces of transparent media, as glass, water, etc. (2) By transmission through crystals possessing the property of double refraction, as Iceland spar. (3) By transmission through a sufficient number of transparent uncrystallized plates placed at proper angles. (4) By transmission through a number of other bodies imperfectly crystallized, as agate, mother-of-pearl, etc. The knowledge of this singular property of light has afforded an explanation of some interesting phenomena in optics. A simple example of polarization may be illustrated by two slices of the semitransparent mineral tourmaline cut parallel to the axis of the crystal. If one is laid upon the other in the positions A B (see fig. below) they form an opaque combination. If one is turned round upon the other at various angles it will be found that greatest transparency is produced in the



Polarization of Light.

position corresponding with *a b* (which represents the natural position they originally occupied in the crystal), an intermediate stage being that shown at *a′ b′*. The light which has passed through the one plate is polarized, and its ability to pass through the other plate is thus altered. Reflection is another very common cause of polarization. The *plane of polarization* is that particular plane in which a ray of polarized light incident at the polarizing angle is most copiously reflected. When the polarization is produced by reflection the plane of reflection is the plane of polarization. According to Fresnel's theory, which is that generally received, the vibrations of light polarized in any plane are perpendicular to that plane. The vibrations of a ray reflected at the polarizing angle are accordingly to be regarded as perpendicular to the plane of incidence and reflection, and therefore as parallel to the reflecting surface. Polarized light cannot be distinguished from common light by the naked eye; and for all experiments in polarization two pieces of apparatus must be employed — one to produce polarization, and the other to show it. The former is called a *polarizer*, the latter an *analyzer;* and every apparatus that serves for one of these purposes will also serve for the other. One such apparatus is shown in the article *Polariscope*. The usual process in examining light with a view to test whether it is polarized, consists in looking at it through the analyzer, and observing whether any change of brightness occurs as the analyzer is rotated. There are two positions, differing by 180°, which give a minimum of light, and the two positions intermediate between these give a maximum of light. The extent of the changes thus observed is a measure of the completeness of the polarization of light. Very beautiful colors may be produced by the peculiar action of polarized light; as for example, if a piece of selenite (crystallized gypsum) about the thickness of paper is introduced between the polarizer and analyzer of any polarizing arrangement, and turned about in different directions, it will in some positions appear brightly colored, the color being most decided when the analyzer is in either of the two critical positions which give respectively the greatest light and the greatest darkness. The color is changed to its complementary by rotating the analyzer through a right angle; but rotation of the selenite, when the analyzer is in either of the critical positions, merely alters the depth of the color without changing its tint, and in certain critical positions of the selenite there is a complete absence of color. A different class of appearances is presented when a plate, cut from a uniaxial crystal by sections perpendicular to the axis, is inserted between the polarizer and the analyzer. Instead of a broad sheet of uniform color, there is exhibited a system of colored rings, interrupted when the analyzer is in one of the two critical positions by a black or white cross. Observation of this phenomenon affords in many cases an easy way of determining the position of the axis of the crystal, and is therefore of great service in the study of crystalline structure. Crystals are distinguished as dextrogyrate or lævogyrate, according as their colors ascend by a right-handed or left-handed rotation of the analyzer horizontally. Glass in a state of strain exhibits coloration when placed between a polarizer and analyzer, and thus we can investigate the distribution of the strain through its substance. Unannealed glass is in a state of permanent strain. A plate of ordinary

glass may be strained by a force applied to its edges by means of a screw. The state of strain may be varied during the examination of the plate by polarized light. A plate of quartz (a uniaxial crystal) cut at right angles to the optic axis exhibits, when placed between an analyzer and polarizer, a system of colored rings like any other uniaxial crystal; but we find that the center of the rings, instead of having a black cross, is brightly colored — red, yellow, green, blue, etc., according to the thickness of the plate.

Polder (pōl'dėr), the name given in the Netherlands to an area of land reclaimed from the sea, a marsh, or a lake by artificial drainage, protected by dykes, and brought under cultivation. The polders were for the most part formerly permanently submerged areas. The usual method of procedure in the formation of a polder is to enclose the portion to be reclaimed by an embankment, and construct a channel having its bed sufficiently high to cause a current towards the sea or river. The water is then pumped into this canal by means of apparatus driven by steam or otherwise. See *Netherlands*.

Pole (pōl), the name given to either extremity of the axis round which the earth revolves. The northern one is called the *north pole*, and the southern the *south pole*. Each of these poles is 90° distant from every part of the equator. In astronomy, the name is given to each of the two points in which the axis of the earth is supposed to meet the sphere of the heavens, forming the fixed point about which the stars appear to revolve. In a wider sense a pole is a point on the surface of any sphere equally distant from every part of the circumference of a great circle of the sphere; or a point 90° distant from the plane of a great circle, and in a line passing perpendicularly through the center, called the axis. Thus the zenith and nadir are the *poles* of the horizon. So the *poles* of the ecliptic are two points of the sphere whose distance from the poles of the world is equal to the obliquity of the ecliptic, or they are 90° distant from every part of the ecliptic. *Pole*, in physics, is one of the points of a body at which its attractive or repulsive energy is concentrated, as the poles of a magnet, the north pole of a needle, as in the compass, or the poles of a battery.

Pole, Perch, or Rod, a measure of length containing 16½ feet or 5½ yards. Sometimes the term is used as a superficial measure, a square pole denoting 5½x5½ yards, or 30¼ square yards.

Pole, Reginald, cardinal and statesman, born in Staffordshire in 1500; died in 1558. He was the son of Sir Richard Pole, Lord Montacute, cousin to Henry VII, by Margaret, daughter of the Duke of Clarence, brother to Edward IV. He was educated at Oxford, and had several benefices conferred on him by Henry VIII, with whom he was a great favorite. In 1519 he visited Italy, and fixed his residence at Padua. He returned to England in 1525, but about 1531 lost the favor of Henry by his opposition to the divorce of Queen Catherine. He retired to the continent for safety, was attainted, and his mother and brother were executed. On the accession of Mary (1553) he returned to England as papal legate, and on the death of Cranmer became Archbishop of Canterbury, and was at the same time elected chancellor of the universities of Oxford and Cambridge. He died in Lambeth Palace the day after Mary's death. He seems to have been noted for his mildness, generosity, and comparative moderation, in an age when persecution was deemed lawful on all sides.

Pole-axe, an axe attached to a pole or handle of which the length varies considerably. It was formerly used by mounted soldiers, and in the navy for boarding purposes.

Polecat (pōl'kat), a name common to several species of digitigrade carnivora of the weasel family (Mustelidæ). The common polecat (*Mustēla putorius* or *Putorius fœtidus*) is found in most parts of Europe. Its body is about 17 inches long, and the tail 6 inches. The color is dark brown. It is a nocturnal animal, sleeping during the day and searching for its prey at night. It is especially destructive to poultry, rabbits, and game, as pheasants, so that in Britain it is being rapidly exterminated by gamekeepers, farmers, and others. Frogs, toads, newts, and fish are often stored as food by this voracious animal. It has glands secreting a fetid liquor, somewhat like that of the American skunk, which it ejects when irritated or alarmed. The name of 'Foumart' is also applied to the polecat; and its fur, which is imported in large quantities from Northern Europe, is known as that of the 'Fitch.' Its hairs form a superior kind of artists' brushes.

Polemics (pō-lem'ikz), the art or practice of disputation generally, but in a special sense that branch

of theological learning which pertains to the history or conduct of ecclesiastical controversy.

Polemoniaceæ (pol-e-mon-i-ā′se-ē), a natural order of monopetalous exogens with a trifid stigma, three-celled fruit, and seeds attached to an axile placenta, the embryo lying in the midst of albumen. They consist for the most part of gay-flowered, herbaceous plants, natives of temperate countries, and particularly abundant in the northwestern parts of America. They are of no economical importance. Some are cultivated for their beauty, the well-known phlox being one.

Polemoscope (po-lem′u-skōp), a sort of stand or frame high enough to rise above a parapet or other similar object, having a plane mirror at top so fitted as to reflect any scene upon another mirror below, and thus enable a person to see a scene in which he is interested without exposing himself.

Polenta (pō-len′ta), a preparation of either semolina, Indian corn, or chestnut-meal, made into a porridge and variously flavored; a common article of diet in Italy and France. It is allowed to boil until it thickens, and is then poured into a dish, where it becomes firm enough to be cut into slices.

Pole-star, the star *a* of the constellation Ursa Minor, situated about 1° 20′ from the north celestial pole, round which it thus describes a small circle. It is of the second magnitude, and is of great use to navigators in the northern hemisphere. Two stars called the pointers, in the constellation Ursa Major (the Great Bear, commonly called the Plow), always point in the direction of the pole-star, and enable it to be found readily.

Polianthes (pol-i-an′thus), a genus of plants belonging to the nat. order Amaryllidaceæ. They are natives of the East Indies and S. America, and mostly require the aid of artificial heat, under shelter of frames and glasses, to bring them to flower in perfection. The *P. tubcrosa* or *tuberose* is well known for its delicious fragrance. See *Tuberose.*

Police (po-lēs′), the system instituted by a community to maintain public order, liberty, and the security of life and property. In its most popular acceptation the *police* signifies the administration of the municipal laws and regulations of a city or incorporated town or borough. The primary object of the police system is the prevention of crime and the pursuit of offenders; but it is also subservient to other purposes, such as the suppression of mendicancy, the preservation of order, the removal of obstructions and nuisances, and the enforcing of those local and general laws which relate to the public health, order, safety and comfort. The term is also applied to the body of men by which the laws and regulations are enforced. A police force may be either open or secret. By an open police is meant officers dressed in their accustomed uniform, and known to everybody; while by a secret police is meant officers whom it may be difficult or impossible to distinguish from certain classes of citizens, whose dress and manners they may think it expedient to assume, in order that they may the more easily detect crimes, or prevent the commission of such as require any previous combination or arrangement. This latter class of officer is termed in Britain and America a *detective.* See *Constable.*

Police Burgh. See *Burgh.*

Policinello. See *Punchinello.*

Policy of Insurance. See *Insurance.*

Polignac (pol-in-yȧk), Jules Auguste Armand Marie, Prince de, a French statesman, belonging to an ancient French family, born at Paris in 1780; died at St. Germain in 1847. After the restoration he was appointed adjutant-general to the king, and entered the chamber of peers. In 1820 he obtained from the pope the title of a Roman prince. In 1823 he succeeded Châteaubriand as ambassador at London; but after the accession of Charles X spent the greater part of his time in Paris. He was successively minister of foreign affairs and president of the council. At the revolution of 1830 he was apprehended and condemned to perpetual imprisonment. He remained in the fortress of Ham till the amnesty of 1836 allowed him to take up his residence in England. He was ultimately permitted to return to France. He was the author of *Considérations Politiques* (1832). Several other members of the family were men of some note.

Polignano (po-lē-nyä′no), an Italian town, province of Bari, on the Adriatic, 26 miles E. S. E. of Bari, on the Bari-Brindisi railway. There is a trade in lemons and oranges. Pop. 8341.

Polillo (pō-lēl′yō), one of the Philippine Islands, E. of Luzon; length, 30 miles; breadth, 20 miles. Rice, maize, sesame, cotton, hemp and timber are produced.

Polishing (pol′ish-ing) is the name given to the process by

which the surface of a material is made to assume a perfectly smooth and glossy appearance, usually by friction. The article to be polished must first be made smooth and even, after which the polishing begins. In the case of wood the process is commonly effected by rubbing with French polish (which see). In metals, by polishing-steel or bloodstone, or by wood covered over with leather, and on which pulverized tripoli, chalk, tin-putty, etc., is sprinkled. In glass and precious stones, by tin-putty and lead siftings; in marble, by tin-putty and tripoli; in granite and other hard stones, by tripoli and quicklime.

Polishing-powder, a preparation of plumbago for polishing iron articles; also a composition variously made up for cleaning gold and silver plate. See *Plate-powder.*

Polishing-slate, a gray or yellowish slate, composed of microscopic infusoria, found in the coal-measures of Bohemia and in Auvergne, and used for polishing glass, marble and metals.

Politian (po-lish'e-an), Angelo Ambrogini, an Italian scholar, known also as *Poliziano* or *Politianus*, born in 1454; died in 1494. The first production which brought him into notice was a Latin poem on the tournament of Giulio de Medici. He assumed the ecclesiastical habit, and acquired the favor of Lorenzo de' Medici, who made him tutor to his children, and presented him with a canonry in the cathedral of Florence. In 1484 he visited Rome, and after his return to Florence he lectured with distinguished success on the Latin and Greek languages, and likewise on philosophy. He wrote an *Account of the Conspiracy of the Pizza;* a Latin translation of Herodian; and a collection of Greek Epigrams; besides Latin odes and epigrams, and a Latin poem entitled *Rusticus.* He also contributed greatly to the correction and illustration of the *Pandects.*

Political Economy, the science of the social ordering of wealth, or the science which has as its aim the investigation of the social conditions regulating the production, distribution, exchange, and consumption of wealth, the term wealth being understood to mean all articles or products possessing value in exchange. While, however, political economy is susceptible of wide definition on these lines, the exact scope of the science within the terms of the definition has been the subject of much confused debate. From the nature of the actual conditions of the production and regulation of wealth, and the place of the systematic examination of these as departmental to a larger science investigating the natural laws of the formation and progress of civilized communities, it is impossible to sunder it entirely from physical, intellectual, and moral considerations tending to enlarge indefinitely its scope. The varying extent to which these elements have entered into the treatment of the subject by economists has given rise to controversy not only as to whether economics is to be considered as a physico-mental or a purely mental science, but even as to its claim to be considered an independent science at all. By most economists it is urged, that as the reasoned and systematic statement of a particular class of facts it may rightly claim to be considered a science, while, as dealing with inanimate things only incidentally as the measure of motives of desire, it is to be classed with the moral or social sciences. Of more importance, as affecting the whole history of the science, have been the questions arising from the method employed in economic inquiry. The modern English school of economists, including the names of Adam Smith, Ricardo, Mill, Cairns, Fawcett and Marshall, have been mainly guided by the deductive method, its more extreme representatives, such as Senior, asserting this method to be the only one applicable to the science. In point of fact political economy has necessarily availed itself of both methods. It has been deductive in so far as it has assumed at the outset certain hypotheses, and derived from these by a dialectical process the guiding principles of the science; but even the older economists, working under the immediate influence of the mathematico-physical sciences chiefly, cannot be justly accused of having overlooked, though they tended to underestimate, the necessity of supplementing deduction by induction. The hypothesis on which the economic system was founded, was that in the economic sphere the principal motive of human action was individual self-interest, leading men to seek to obtain the greatest amount of wealth with the least expenditure of effort; this hypothesis being followed out to its logical conclusions, under assumed conditions of perfectly free competition, in connection with the facts of the limitations of the earth's extent and productiveness, and the theory of a tendency in the race to multiply to an incalculable extent in the absence of natural or artificial obstacles. On this basis theories of value, rent, and population were formed having the character of laws, but of laws which were hypothetical merely

— true only under the assumed conditions of an environment in which competition was free and frictionless, unhampered by inertness, ignorance, restrictive customs, and the like. In this respect the method adopted and the results arrived at found analogy in those physical sciences the laws of which are only applicable in actual fact under large and variable modification. There was, however, an indisputable tendency among the earlier economic writers to regard these hypothetical laws as in a greater degree representative of actual fact than they were, and even, when the actual facts fell short of the theoretic conditions, to regard these as prescriptive and regulative. The ethical protest against this tendency found a strong support in the development of the group of biological sciences, opening up new conceptions of organic life and growth; and as the result of these and other influences the old rigidity in the application of theory has largely disappeared. Where the older economist tended to look upon the subject matter of economics as more or less constant and furnishing laws of universal application, the modern economist, having regard to the complexity and variability of human motives and the development of the race both in the matter of character and institutions has come to recognize that the abstract conception of a frictionless competitive atmosphere, in which self-interested motives worked with mechanical regularity, can never bear other than a qualified application to actual economic conditions, and that laws relating to the economic aspects of life at one stage of human development seldom apply at another without large modification. He realizes clearly what the older economists only imperfectly perceived, and even more imperfectly expressed, that the system they were elaborating was to be considered rather as an instrument to assist in the discovery of economic truth than a body of truths representing any actual or desirable social state. When regarded in this light — as a means to assist in the disentanglement of the complex motives operative in actual economic relations — the isolation of one set of economic forces, and the tracing of the logical issues of these become of the highest value, despite the danger in careless use of neglecting necessary modification and of translating its hypothetic statements into prescriptions for conduct and social organization. It has been this neglect, the assumption of didactic authority, and the extent of the modifications often necessary in the practical application of theory which have tended to bring the older school into discredit at the hands of Comte, Cliff Leslie, Ruskin, and a large number of foreign economists — some complaining with Comte of the tendency to vicious abstractions, and the impossibility of isolating to any useful end the special phenomena of economics from other social phenomena; some, like the German and American historic schools, arguing that it is desirable and necessary to reason direct from historic facts to facts without the intervention of any formal economic theory. So far, however, the opponents of the older method of dealing with economic problems, though they have accomplished an admirable work in clearing the older economics of many confusions and misapprehensions, have failed to supply a superior method of analyzing the phenomena constituting the subject matter of the science, while many of them have not scrupled to avail themselves largely of the results arrived at by the method they condemn. On the grounds of difference in method, and in conception of the scope of the science, the economists of to-day may be classified as forming four principal groups: —

1. The modern orthodox philosophic school, working, as indicated above, on the basis of a body of hypothetical principles, constituting the statics of exchange and distribution, deductively arrived at by the consideration of the operations of motives of self-interest in an environment of free and frictionless competition — principles imperfectly representing actual economic conditions, but of assistance, under due precautions, in the accurate analysis of these.

2. A group of mathematical economists allied to the philosophic school as working on the deductive basis, and largely engaged in translating philosophic theory into symbolic formulæ for retranslation into theory.

3. The historical school, denying the value of deductive economics, and seeking to confine the work of the economist to the description of the various stages of economic civilization as they have arisen, and the indication, under due conditions of time, place, and natural development, of such relative principles as may be discoverable in them.

4. A group of economic students who approach political economy from the point of view of a previous training in 'the sciences of inorganic and vital nature' (physics and biology as opposed to metaphysics), and who wish to include within the scope of economics the consideration of wealth as measured, not by subjective emotions and desires, but by the objective utility of things, the part played by them

in the maintenance and evolution of society, the definitely determinable capacities they may possess of supplying physical energy and improving the physiological constitution of the race. From this point of view, economics is to be regarded as 'the direct study of the way in which society has actually addressed itself, and now addresses itself, to its own conservation and evolution through the supply of its material wants' (Ingram) — a study, therefore, inseparable from the study of sociology as a whole, and to be followed up under the immediate guidance or bias of a moral synthesis and a therapeutic aim.

The general scope of the science from the neo-orthodox standpoint may be broadly indicated under four heads: —

I. Production: dealing with the requisites of production — Land (natural agents), Labor, and Capital; the law of fertility of land (Law of Diminishing Returns); the laws of the growth of population and capital; the organization of industry, division of labor, etc.

II. The pure theory of values or theory of normal (natural) values, *i. e.*, of values as they would arise in a market where competition was free and undisturbed. Under this head are discussed the relations of value and utility; the laws of supply and demand; cost and expenses of production; the law of rent and the relation of rent to value; the considerations determining the normal share of the various classes of producers in the value of the product; the laws of supply and demand in relation to skilled and unskilled labor and to capital; the laws of wages and earnings, etc.

III. The application of the pure theory of values under the conditions of actual trade — internal and international: treating of the medium of exchange; the influence of changes in the purchasing power of money; influence of modern credit systems; the influence upon prices and wages and profits of local customs, monopolies, combinations, trades unions, coöperation, etc.; the conditions of foreign exchange; the competition of different countries in the same market, and the like.

IV. The economic functions and influence of government: dealing with Taxation, direct and indirect; the opposing principles of Protection and Laisser-faire, etc.

In the last division the treatment inevitably takes the form not merely of setting forth what is, but of discussing what ought to be; in other words, the method is no longer that of a science aiming at the systematized representation of facts, but rather that of an art, seeking to prescribe and regulate for ethical and prudential reasons the industry and commerce of nations. In this respect a large portion of the discussions usually ranged under this head might well be considered as forming with certain other pressing problems of economic reform a distinct branch of the subject, which may be provisionally described as prescriptive or regulative or therapeutic economics. To this branch would belong the various problems touching the fair share of the different productive classes in the value of the product, and indeed the investigation of the whole question of property in relation to the various schemes of distribution — individualistic, socialistic and communistic. The frequent mixture of these considerations of practical economic reform with the non-moral and indifferent systematization of contemporary economic fact has been a most fertile source of confusion and misunderstanding.

As a separate scheme of knowledge meriting the title of a science, political economy is little more than a century old, but the germs of modern economic doctrines are to be traced long previous. In Greece, Plato, Xenophon and Aristotle alike conducted investigations in economics from an ethical point of view and in subordination to the theory of the state, the last, however, showing a perception of the difference between value in use and value in exchange, of the advantages of division of labor, of the functions of money as a measure of value and an instrument of exchange, of the desirability of maintaining a proportion between population and territory. The Romans followed, without advancing upon, the economics of the Greeks. Cicero opposed manufactures and trade, upholding, in the main, like Cato and Varro, an agrarian ideal; Pliny condemned the effects of servile labor and the exportation of money, and discussed some of the problems connected with value. After the fall of Rome it is not till the latter part of the middle ages that we find the emancipation of the towns and the development of the burgher class admitting of industry and commerce on a wide scale. In the thirteenth century St. Thomas Aquinas paraphrased the doctrines of Aristotle on money and interest, establishing on them a condemnation of interest. His influence lasted into the next century, among the principal writers of which were Bartolo di Sassoferrato, Jean Buridan and Nicolas Oresme, the latter the author of the fullest treatise on money written up till his time. Gabriel Biel, F. Patrizzii, and

Diomede Caraffa are the chief names of the fifteenth century, the study of economics being chiefly pursued by ecclesiastics until the collapse of mediævalism in the sixteenth century. The main economic topics continued to be the nature and functions of money, the legitimacy of usury, institutions of credit, and monti di pietà. Chief among the sixteenth century writers are the names of Jean Bodin in France, and in England the writer W. S. (probably William Stafford), who worked in part from Bodin, Sir Walter Raleigh, Gilbert, Hackluyt and Peckham. The characteristic doctrines developed at this time came to be known as the mercantile system, or Colbertism, and found expression in the close of the sixteenth and beginning of the seventeenth centuries chiefly in the writings of Antonio Serra in Italy, Antoine de Montchrétien in France, and Thomas Mun in England. They were opposed by a few early advocates of free trade, including Emérique de Lacroix in France and Alberto Struzzi in Spain. In the second half of the seventeenth century considerable advancement was made by Hobbes, Locke, Sir Joshua Child, Sir William Petty and Sir Dudley North, and the foundation of the Bank of England gave rise to much controversy early in the eighteenth century, leading to more enlarged conceptions of the operations of credit. In France Boisguillebert and Vauban opposed Colbertism, and Montesquieu endeavored to work out the economics of government finance. The foundation of the physiocratic school by Quesnay was, however, the chief economic movement of the eighteenth century in France, among its exponents being the elder Mirabeau, De la Rivière, Baudeau, Le Trosne, Dupont de Nemours, Gournay, and especially Turgot, the greatest of the group. It made some little way in Italy and Germany; but its direct influence was not marked in England, where Hume's *Economic Essays* were followed by Adam Smith's epoch-making *Wealth of Nations*, directed against mercantilists and physiocrats alike. New elements were introduced by the population theory of Malthus, and the theory of rent enunciated by Ricardo on the lines indicated by Anderson and West; and the statistical side was developed by Thomas Tooke. In reducing the teaching of Adam Smith to system, the French economist Say played an influential part, and the work was advanced still further by the labors of Torrens, James Mill, McCulloch, Whately, Senior, and other minor writers. No work, however, after the *Wealth of Nations* exercised so wide an influence as that of John Stuart Mill, who despite the signs of revolt, to which allusion has been made, still dominates popular economic thought for good and ill. The names of Longe, Leslie, Thornton, and Cairnes may be noted among the earlier critics or commentators of Mill; while Marshall, working on the basis of Mill, has more accurately defined the limitations of the deductive method in seeking to formulate and apply a pure theory of values. Among other recent writers of importance have been W. Stanley Jevons (mathematical and statistical group), Carl Marx (Socialist), Roscher (historical), Sidgwick (eclectic), and Ingram (Positivist). The Socialistic and Anarchistic hypotheses are two modern views concerning the distribution of wealth and ownership of property which are (especially the former) attracting wide attention.

Political Offenses, are those offenses considered injurious to the safety of the state, or such crimes as form a violation of the allegiance due by a subject to the recognized supreme authority of his country. In modern times the crimes considered political offenses have varied at different periods and in different states. In Britain the most serious political offenses are termed treason (see *Treason* and *Treason-Felony*), and those of a lighter nature, which do not aim at direct and open violence against the laws or the sovereign, but which excite a turbulent and discontented spirit which would likely produce violence, are termed sedition. (See *Sedition.*) Political offenders of foreign countries are by English law not included in extradition treaties. In the United States also, and in most of the countries of Europe, the extradition treaties do not include the giving up of political offenders.

Political Parties, divisions of people in a state marked off by the particular views they hold as to the public policy to be pursued in the best interests of the people at large. In the United States the chief political parties at present are the *Democrats* and *Republicans*, the former favoring a tariff for revenue only, the latter a tariff for the protection of industries. Various minor parties have from time to time arisen, but the principles advocated by the two parties named have been prominent throughout nearly the whole history of the country.

In the normal condition of British politics there are but two political parties, the *Liberal* and the *Conservatives* or

Tories. The former are distinctively advocates of progressive reform, and are subclassed as *Whigs* or *Radicals*, according as their views are moderate or advanced. The Irish question has for the present created two other parties by a division on different lines, *Home Rulers* and *Unionists*, that is, those advocating an Irish legislature for home affairs, and those opposing this view. French political parties are broadly divided into *Republicans* and *Reactionaries*, both of which are subdivided into numerous antagonistic sections, the latter including *Bonapartists* and *Monarchists*, or those who favor a restoration of the old monarchy. In German politics there are the *Ultramontanes*, the *Conservatives*, the *Reichspartei* or *Imperialists*, the *National Liberals*, the *Progressists*, the *Social Democrats*, the *Volkspartei* or *Democrats*, etc.

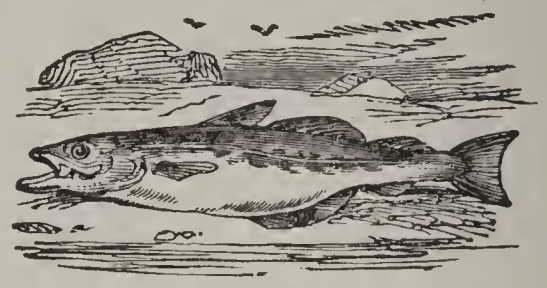
Politics (pol'i-tiks), in its widest extent, is both the science and the art of government, or the science whose subject is the regulation of man in all his relations as the member of a state, and the application of this science. In other words, it is the theory and the practice of obtaining the ends of civil society as perfectly as possible. In common parlance we understand by the politics of a country the course of its government, more particularly as respects its relations with foreign nations.

Poliziano. See *Politian*.

Polk (pōk), James Knox, president of the United States from 1845-49, was born in 1795 in North Carolina; died at Nashville in 1849. He studied law and entered Congress as representative of Tennessee in 1825. He was Speaker of the House of Representatives from 1835 to 1839, when he was elected Governor of Tennessee, but was defeated for this office in 1841. His advocacy of the annexation of Texas led to his nomination by the Democratic party for the Presidency in 1844, Henry Clay being the Whig candidate. The contest was a very close one, but Polk was elected. The annexation of Texas, the Mexican war, the acquisition of Upper California and New Mexico, and the settlement of the Oregon boundary were the chief events of his term of office.

Polka (pōl'ka), a species of dance of Bohemian origin, but now universally popular, the music to which is in $\frac{2}{4}$ time, with the third quaver accented. There are three steps in each bar, the fourth beat being always a rest.

Pollack (pol'ak; *Merlangus pollachius*), a fish of the cod family. The pollack belongs to the same genus as the whiting (*M. vulgāris*); the members of this genus possessing three dorsal fins and two anals. The lower jaw is longer than the upper jaw, and the tail is forked, but not very deeply. It inhabits the Atlantic Ocean, and is common on all the British coasts, as well



Pollack (*Merlangus pollachius*).

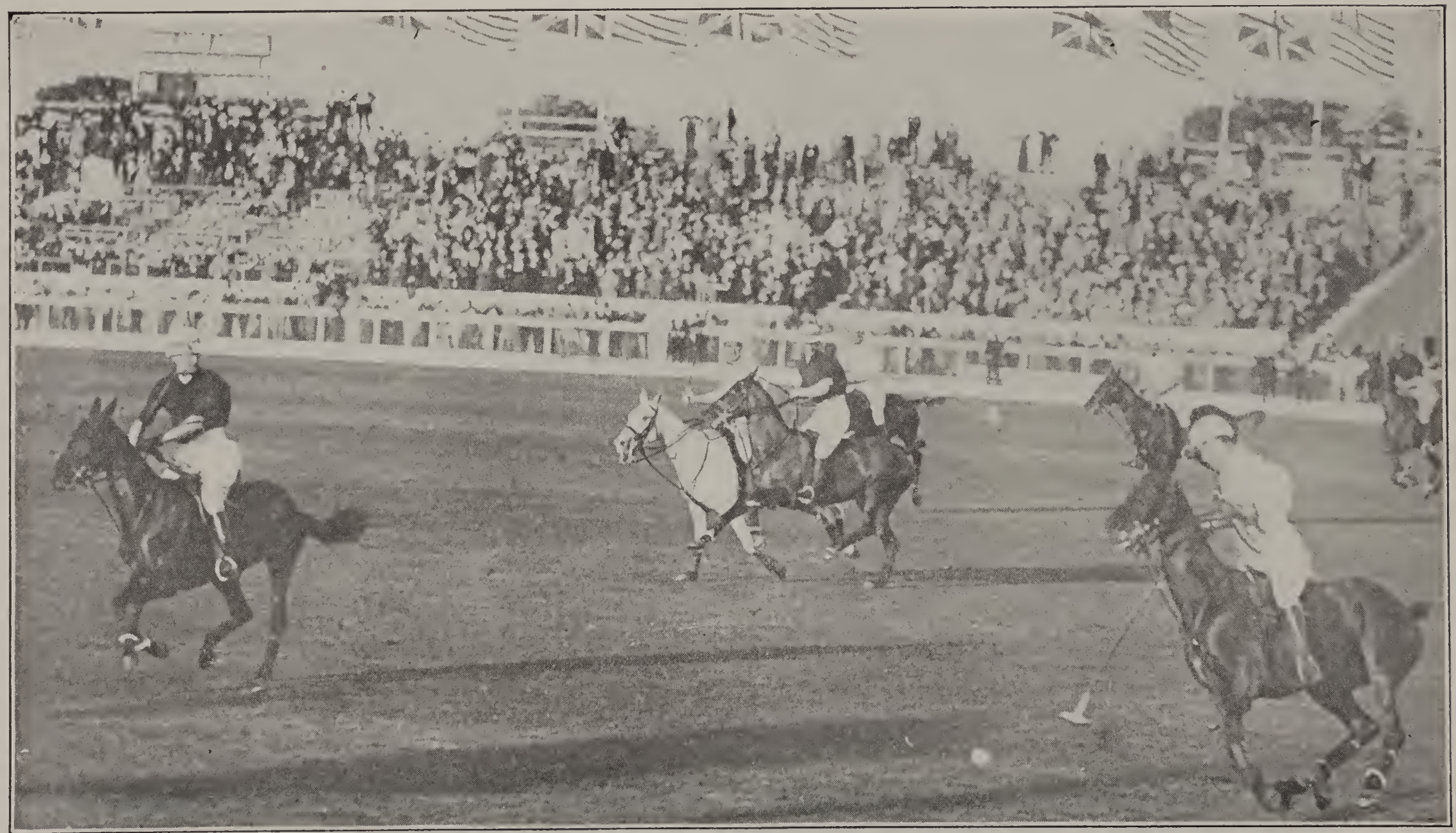
as on the shores of Norway. The northern coasts of Britain appear to be those on which these fishes are most abundant. The pollacks are gregarious in habits, and swim in shoals. They bite keenly at either bait or fly, and afford good eating. Called in Scotland *Lythe*.

Pollan (pol'an), the 'fresh-water herring' (*Coregŏnus Pollan*), a species of fishes belonging to the Salmonidæ. It is an Irish species, and is found in Lough Erne, Lough Neagh, and Lough Derg. It is generally about 9 or 10 inches in length. There is a Scotch species in Loch Lomond known as the *Powan*; another in Lochmaben, the *Vendace*.

Pollanarrua (pol-la-na-ru'a), a ruined city and formerly capital of Ceylon, situated about 60 miles N.E. of Candy. There are numerous large stone figures of Buddha, and remains of temples and other buildings. It flourished from the eighth to the beginning of the thirteenth century. Called also Topare.

Pollard (pol'ard), the name given to a tree the head of which has been lopped off about 8 or 10 feet from the ground, in order to induce it to send out bushy shoots, which are cut periodically for basket-making, fuel, fencing, or other purposes.

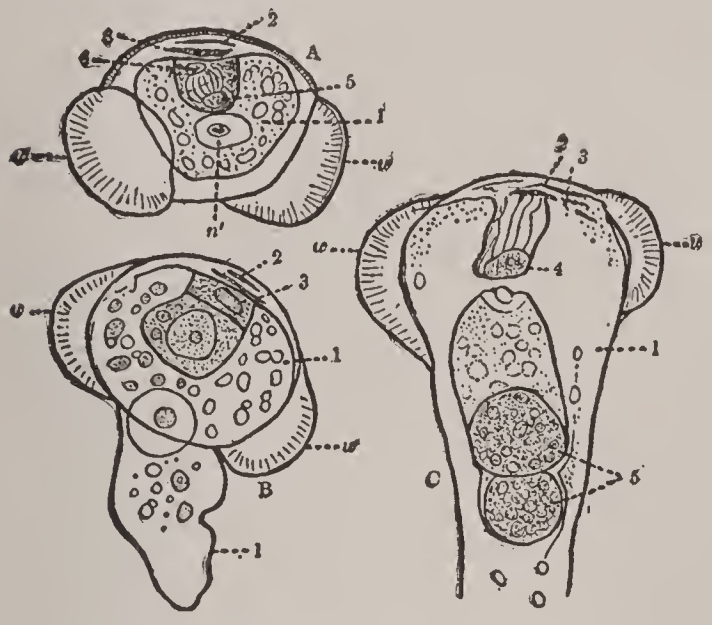
Pollen (pol'en), the male element in flowering plants; the fine dust or powder which by contact with the stigma effects the fecundation of the seeds. To the naked eye it appears to be a very fine powder, and is usually inclosed in the cells of the anther; but when examined with the microscope it is found to consist of hollow cases, usually spheroidal, filled with a fluid in which are suspended drops of oil from the 20,000th to the 30,000th of an inch in diameter, and grains of starch five or six times as



POLO

An incident in the International Polo Match between England and America in the fall of 1911. The rider at the right of the picture has just struck the ball. In the center of the picture the rider in the dark shirt is "riding off" the player in the white shirt to keep him from aiding his team-mate.

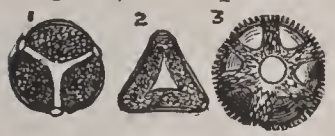
large. Impregnation is brought about by means of tubes (pollen-tubes) which issue



Pollen — Grain of Picea Excelsa.

A, Commencement of germination. B, Further stage, showing pollen-tube. C, more advanced stage.

from the pollen-grains adhering to the stigma, and penetrate through the tissues until they reach the ovary. The cut shows the pollen-grains of (1) manna-ash (*Fraxĭnus ornus*), (2) clove (*Caryophylus aromaticus*), (3) strong-scented lettuce (*Lactūca virōsa*).



Pollen Grains (magnified).

Pollenza (pol-yen′thå), a town of Spain, in the island of Majorca, 28 miles northeast of Palma. It has a fine Jesuit college, partly ruinous; and manufactures of linen and woolen cloth. Pop. 8368.

Pollio (pol′li-o), Caius Asinius, a Roman of plebeian family, born B.C. 76; died A.D. 4. He took a prominent part in the civil war, and accompanied Julius Cæsar to Pharsalia, and then to the African and Spanish wars. After obtaining the consulship he commanded in Illyria and Dalmatia, and for his victories was honored with a triumph B.C. 39. He afterwards devoted most of his time to literary pursuits, but acted both as a senator and an advocate. His works, consisting of speeches, tragedies, and a history of the civil war in seventeen books, have all been lost. He was the friend of Virgil and Horace, and founded the first public library in Rome.

Pollok (pol′lok), Robert, a Scottish poet, was born at Muirhouse, in the parish of Eaglesham, Renfrewshire, in 1799; died at Southampton in 1827. He was educated at Glasgow University, studied divinity, and was licensed as a preacher by the Associate Presbytery of Edinburgh in the spring of 1827. He is the author of a series of *Tales of the Covenanters*, and a blank verse poem, *The Course of Time*, which in spite of many faults has enjoyed a wonderful popularity both in Britain and America. He died of pulmonary disease soon after the publication of his poem.

Pollokshaws (pol-luk-shąz′), a town of Scotland, county of Renfrew, a little to the southwest of Glasgow, on the White Cart. The inhabitants are principally employed in the manufacture of cotton fabrics, iron-founding, engineering, papermaking, etc. Pop. 11,183.

Poll-tax (pōl′taks), a tax levied per head in proportion to the rank or fortune of the individual; a capitation tax. This tax was first levied in England in 1377 and 1380, to defray the expenses of the French war; its collection in 1381 led to the insurrection of Wat Tyler. In the United States a poll-tax (varying from 25 cts. to $3 annually) is levied in about half the states, as a requirement for the suffrage.

Pollux. See *Castor and Pollux.*

Pollux (pol′luks), Julius, a Greek sophist and grammarian, born at Naucratis, Egypt, about the year 135 A.D. He went to Rome during the reign of Marcus Aurelius, who appointed him one of the preceptors of his son Commodus. He wrote several works, all of which have perished except his *Onomasticon*, dedicated to Commodus, and therefore published before 177. This work is of great value in the study of Greek antiquity.

Polo (pō′lō), a game at ball resembling hockey. The players are mounted on ponies, and wield a 'mallet' 4 feet 4 inches in length (a hickory rod with a mallethead at the end). It is played by sides, and the object is to drive the ball from the center of the ground through either of the goals, the side gaining the most goals being the winner.

Polo, Gaspar Gil, a Spanish poet, born at Valencia about 1517; died in 1572. His reputation was established by his *Diana Enamorada*, a pastoral romance, partly in prose and partly in verse. Cervantes excepts the *Diana* of Polo from his list (in *Don Quixote*) of works condemned to be burned. It has been translated into French, English and Latin.

Polo, Marco, a Venetian traveler, was born about the year 1256. His

father, Nicolo, was the son of Andrea Polo, a patrician of Venice. Shortly before Marco's birth, Nicolo with his brother Matteo set out on a mercantile expedition, and ultimately arrived at Kemenfu, on the frontiers of China, where they were favorably received by Kubilai, the grand-khan of the Mongols. In 1266 the khan sent the brothers on a mission to the pope, and they arrived in Venice in 1269. Two years later they again set out for the East, this time accompanied by the young Marco. After reaching the court of Kubilai, Marco rapidly learned the language and customs of the Mongols, and became a favorite with the khan, who employed him on various missions to the neighboring princes. Soon afterwards he was made governor of Yang-tchou, in Eastern China, an appointment he held for three years. In 1292 the three Polos accompanied an escort of a Mongolian princess to Persia. After arriving at Teheran they heard of Kubilai's death, and resolved to return home. They reached Venice in 1295. In the following year Marco Polo took part in the naval battle of Curzola, in which he was taken prisoner. During his captivity he dictated to a fellow-prisoner, Rustichello or Rusticiano of Pisa, an account of all his travels, which was finished in 1298. After his liberation he returned to Venice, where he died in 1323. His book — known as the *Book of Marco Polo* — created an immense sensation among the scholars of his time, and was regarded by many as pure fiction. It made known to Europeans the existence of many nations of which they were formerly totally ignorant, and created a passion for voyages of discovery. It has gone through numerous editions in the various European languages, but the best is that of Col. (Sir Henry) Yule, accompanied with a great amount of learned elucidation and illustration. It was originally written in French, but Latin and Italian MSS. of it are more common.

Polonaise (pō-lu-nāz′; Italian, *Polacca*) is a Polish national dance, which has been imitated, but with much variation, by other nations. The *Polonaise*, in music, is a movement of three crotchets in a bar, characterized by a seeming irregularity of rhythm, produced by the syncopation of the last note in a bar with the first note of the bar following, in the upper part or melody, while the normal time is preserved in the bass.

Polonium (pō-lō′ni-um), the name given a radio-active substance discovered by Madame Curie in the researches which led to the discovery of radium. So named from Poland, her native country.

Polotzk (po′lotsk), a town in Russia, government of Vitebsk, at the confluence of the Polotka and the Dwina. The most remarkable edifices are a dilapidated castle built by Stephen Bathory, King of Poland, in the sixteenth century, and the old Jesuit convent and college. It has an increasing trade, especially with Riga, in corn, flax, linseed, etc., and tanning is carried on to some extent. A battle took place here between the Russians and the French in 1812, in which the latter were defeated. Pop. 20,751.

Poltava (pål-tä′vå), or PULTAWA, a government of Russia, bounded by Czernigov, Kharkov, Ekaterinoslav, Kherson and Kiev; area, 19,265 sq. miles. It consists of an extensive and somewhat monotonous flat, watered by several tributaries of the Dnieper. It is one of the most fertile and best cultivated portions of the Russian Empire, and grows large quantities of grain. Live stock and bee rearing are important branches of the rural economy. Both manufactures and trade are of very limited extent. Education is much neglected. Pop. 3,312,400.— POLTAVA, the capital, at the confluence of the Poltava with the Worskla, has straight and broad streets, a cathedral, important educational institutions, etc. As a place of trade Poltava derives importance from the great fair held on July 20th each year. Wool is the great staple of trade. Horses, cattle, and sheep are likewise bought and sold in great numbers. It contains a monument to Peter the Great, who here defeated Charles XII in 1709. Pop. 53,060.

Polyadelphia (pol-i-a-del′fi-a), the name given by Linnæus to the eighteenth class of his sexual system, in allusion to the stamens being collected into several parcels.

Polyandria (pol-i-an′dri-a), or POLYANDRY (Greek *polys*, many, and *anēr*, *andros*, a man) denotes the custom of one woman having several husbands (generally brothers) at one time. This system prevailed among the Celts of Britain in Cæsar's time, and occurs yet in Southern India, in Tibet, among the Eskimo, the Aleutians, some tribes of American Indians, and in the South Seas. The practice is believed to have had its origin in unfertile regions in an endeavor to check the undue pressure of population on the means of subsistence.

Polyandria, in botany, the name given by Linnæus to a

class of hermaphrodite plants having many stamens, generally more than twenty, arising immediately from below the ovary.

Polyanthus (pol-i-an'thus), a beautiful and favorite variety of the common primrose (*Primŭla vulgāris*), a native of most parts of Europe, growing in woods and copses in a moist, clayey soil. The leaves are obovate, oblong, toothed, rugose, and villous beneath. The flowers are in umbels on a scape or flower-stalk 3 to 6 inches or more in length. In addition to propagating from seeds polyanthuses may also be readily increased by division. The seeds should be sown in June. The plants should be potted in August. Some will show flowers the same autumn, and many in the following spring. The plants are very hardy, and require to be transplanted every two years.

Garden Polyanthus.

Polybasic Acids (pol-i-bā'sik), acids which possess more than one hydrogen atom capable of being replaced by a metal equivalent.

Polybius (po-lib'i-us), a Greek historian, was born at Megalopolis, in Arcadia, about 204 B.C.; died in 122. His father, Lycortas, was one of the leaders of the Achæan League, and the confidential friend of Philopœmen. Educated for arms and political life, he entered, at the age of twenty-four years, into the military and political service of the League. After the subjugation of Perseus, king of Macedonia, by the Romans (168), Polybius found himself among the 1000 Achæans summoned to Rome to answer before the senate why the League had not aided the Roman army in Macedonia. While in Italy he formed an intimate friendship with Scipio Æmilianus, whom he accompanied on his African campaign, and witnessed the destruction of Carthage. He returned to Greece in 146, just after the fall of Corinth, and exerted himself successfully to obtain moderate terms from the Romans for his countrymen. His principal work is his *History of Rome*, in forty books, from 220 to 140 B.C., with an introduction giving a sketch of the rise of the city from its conquest by the Gauls to the outbreak of the second Punic war. Only the first five books and fragments of the rest are extant.

Polycarp (pol'i-karp), one of the Christian fathers, and, according to tradition, a disciple of the apostle John, was born probably in Smyrna about 69 or 70; martyred 155 or 156. According to a legendary fragment ascribed to a writer named Pionius, he was consecrated bishop of his native city by St. John. During the persecution under Marcus Aurelius, Polycarp was seized and brought before the Roman proconsul at Smyrna. Having refused to renounce his faith, he was condemned to the flames. He wrote several letters, which were current in the early church, but all have perished except one addressed to the Philippians, which appears to have been written about 115, and is valuable for its quotations from the apostolic writings.

Polychrome Printing. See *Color Printing.*

Polychromy (pol'i-krō-mi), the name given to the art of decorating works of sculpture and architecture with different colors. The custom of painting statues is as ancient as sculpture itself; the Egyptians, Assyrians, Phœnicians, Babylonians, and Persians all painted their statues in various colors, especially in red. Polychromy, however, only reached the dignity of a real art among the Greeks. Instead of employing colors, the sculptors of the age of Pericles generally used marbles of different colors fitted together, and the ornaments of their statues were made of various metals and of ivory. Thus the nude parts were, in some cases, of Persian marble, the draperies of streaked onyx, the eyes of gold or ivory, the shields and other arms of bronze, and so forth. Architectural polychromy may be divided into natural polychromy, in which the materials employed produce certain effects by their natural colors; and artificial polychromy, which is simply the application of coats of paint, whether on the exterior or interior parts of the edifice. Both natural and artificial polychromy were used by the Egyptians, Assyrians, Babylonians, and Persians. Polychromy was cultivated by the Romans in a much more restricted style. In the public buildings of the later Romans gold decorations and facings of variegated stone were used instead of mere colors. In the middle ages polychrome architecture was adopted by the Arabs and Byzantines. A fine example of Byzantine architecture in polychrome style is the Palatine

Chapel at Palermo, erected in 1232. On the establishment of Gothic architecture polychromy was introduced into the interior of churches. This practice was maintained throughout the middle ages.

Polycletus (pol-i-klē′tus) of SICYON, a Greek sculptor and architect, who flourished about 452-412 B.C. His most celebrated statues were the *Doryphorus* ('Spear-bearer'), to which the name of *canon* or model was given; and his statue of *Hera* (Juno) in the temple between Argos and Mycenæ. As an architect he also distinguished himself.

Polycotyledonous Plants (pol-i-kō-ti-lē′do-nus), those plants of which the embryos have more than two cotyledons or seed-lobes. Instances occur in plants of the cruciferous order, and in coniferous plants.

Polycratēs (pol-ik′ra-tēz), a Greek tyrant or absolute ruler of Samos during the time of the elder Cyrus. He made himself master of the island by violence, and having secured absolute sway seized upon several of the neighboring islands and some towns upon the mainland. In 522 B.C. the Persian satrap Oroetes treacherously invited Polycrates to his palace, and there crucified him. Polycrates seems to have had much taste for learning and the arts, and greatly promoted the refinement of the Samians.

Polycystina (pol-i-sis-tē′na), a group of Protozoa, division Rhizopoda, order Radiolaria, consisting of minute organisms allied to the Foraminifera, but their shells are of siliceous matter, while those of the latter are calcareous. The bodies of the Polycystina are composed of a brownish sarcode-matter apparently containing yellow globules, which protrudes in the form of elongated filaments (*pseudopodia*) through apertures in the shells. The Polycystina inhabit the sea-depths, and are abundantly represented as fossil organisms, as in the 'infusorial earth' of Barbadoes.

Polydeucēs (pol-i-dū′sēz), or POLYDEUKĒS, the Greek name of Pollux. See *Castor and Pollux.*

Polydipsia (pol-i-dip′si-a), a term applied to diabetes.

Polyembryony (pol-i-em′bri-o-ni), in botany, a phenomenon occurring, sometimes regularly and sometimes abnormally, in the development of the ovules of flowering plants, consisting in the existence of two or more embryos in the same seed.

Polygala (po-lig′a-la), a genus of plants of the natural order Polygalaceæ. The species abound in milky juice, and are found in most parts of the world. The root of *P. Senĕga* (senega or seneca root or Virginian snake-root) is a stimulating diuretic, useful in pneumonia, asthma, and rheumatism. *P. vulgāris*, the common milkwort, is a beautiful plant, found in dry pastures.

Polygalaceæ (pol-i-ga-lā′se-ē), a natural order of herbs or shrubs, with alternate, exstipulate, simple leaves; irregular hermaphrodite flowers; diadelphous or monadelphous stamens; anthers opening at the apex by a pore or chink. Nearly half the species are comprised in the genus *Polygala*, and are very generally distributed. The plants of this order are mostly bitter, and acid or astringent.

Polygamy (po-lig′a-mi) consists in a man's having more than one wife at the same time. In ancient times polygamy was practiced by all the Eastern nations, and was sanctioned or at least tolerated by their religions. It was permitted to some extent among the Greeks, but entirely disappeared with the later development of Greek civilization. To the ancient Romans and Germanic races it was unknown. It prevailed among the Jewish patriarchs both before and under the Mosaic law. But in the New Testament we meet with no trace of it. Polygamy has never been tolerated among Christians, although the New Testament contains no injunction against it. It is, however, practiced by the Mohammedans and Mormons. A statute of Edward I treated polygamy as a capital crime. See *Mormons.*

Polyglot (pol′i-glot; Greek, *polys*, many, and *glōtta*, language), a work which contains the same matter in several languages. It is more particularly used to denote a copy of the Holy Scriptures in which two, three, or more translations are given, with or without the original. The first great work of the sort is the *Complutensian polyglot*, prepared under the direction of Cardinal Ximenes, and splendidly printed (1514-17), in 6 folio volumes, at Alcala de Henares, called in Latin *Complutum*, whence the name of the work. It contains the Hebrew text of the Old Testament, with the Vulgate, the Septuagint, a literal Latin translation, and a Chaldee paraphrase (which is also accompanied by a Latin translation). Another celebrated polyglot is that of Antwerp, called the *Royal Bible*, because Philip II of Spain bore part of the cost of publication. It was conducted by the learned Spanish

theologian, Benedict Arias Montanus, assisted by other scholars. It appeared at Antwerp in 8 folio volumes (1569-72). The *Paris polyglot* appeared in 1645, in 10 folio volumes. The *London* or *Walton's polyglot*, in ten languages, appeared in 6 volumes folio, with two supplementary volumes (London, 1654-57). It was conducted under the care of Bryan Walton, afterwards Bishop of Chester, and contains all that is in the *Paris polyglot*, but with many additions and improvements. It contains the original text according to several copies, with an Ethiopic and a Persian translation, and the Latin versions of each. *Bagster's polyglot* (folio, London, 1831) gives eight versions of the Old Testament and nine of the new.

Polygnotus (pol-ig-nō'tus), a Greek painter, who flourished from 450 to 410 B.C. He was a native of the Island of Thasos, and was instructed in his art by his father, Aglaophon. Cimon, the rival of Pericles, brought him to Athens and employed him to decorate the Stoa Pœcilē, or painted portico, at Athens. His works were probably on wood. Polygnotus is represented as being the first who made painting independent of sculpture.

Polygon (pol'i-gon; Greek, *polys*, many, *gōnia*, an angle). In geometry, a plane figure of many angles and sides, or at least of more than four sides. A polygon of five sides is termed a *pentagon;* one of six sides, a *hexagon;* one of seven sides, a *heptagon*, and so on. *Similar polygons* are those which have their several angles equal each to each, and the sides about their equal angles proportional. All similar polygons are to one another as the squares of their homologous sides. If the sides, and consequently the angles, are all equal, the polygon is said to be regular; otherwise, it is irregular. Every regular polygon can be circumscribed by a circle, or have a circle inscribed in it.— *Polygon of forces*, in mechanics, the name given to a theorem which is as follows: — If any number of forces act on a point, and a polygon be taken, one of the sides of which is formed by the line representing one of the forces, and the following sides in succession by lines representing the other forces in magnitude, and parallel to their directions, then the line which completes the polygon will represent the resultant of all the forces.

Polygonaceæ (pol-ig-o-nā'se-ē), a natural order of herbaceous plants, with trigonal fruit, and usually with stipules united into a tube or ochrea, through which the stem passes. They have astringent and acid properties; some are purgative, and a few are acrid. Among the best-known species are rhubarb, the docks, and the sorrels. See *Polygonum*.

Polygonum (pol-ig'o-num), a genus of herbaceous plants, natural order Polygonaceæ. They are found in the temperate regions of Europe, Africa, North America, and Asia. They are herbaceous, rarely shrubby plants, with alternate stipulate or exstipulate leaves, and spikes of small, pink flowers. Several British species are known by the name of persicarias. See *Bistort, Buckwheat, Knot-grass.*

Polygynia (pol-i-jin'i-a), one of the orders in the fifth, sixth, twelfth, and thirteenth classes of the Linnæan system, comprehending those plants which have flowers with many pistils, or in which the pistils or styles are more than twelve in number.

Polyhedron (pol-i-hē'drun), in geometry, a body or solid bounded by many faces or planes. When all the faces are regular polygons similar and equal to each other the solid becomes a regular body. Only five regular solids can exist, namely, the tetrahedron, the hexahedron, the octahedron, the dodecahedron, and the icosahedron.

Polyhymnia (pol-i-him'ni-a), or Polym'nia, among the Greeks, the muse of the sublime hymn, and according to some of the poets, inventress of the lyre, and of mimes. She is usually represented in art as covered with a white mantle, in a meditative attitude, and without any attribute.

Polymerism (pol-im'er-izm) is a particular instance of isomerism (which see). *Polymerization* is a name given to the process by which a chemical compound is transformed into another having the same chemical elements combined in the same proportions but with different molecular weights: thus the hydrocarbon amylene, C_5H_{10}, when acted on by strong sulphuric acid, is converted into the polymer paramylene, $C_{10}H_{20}$.

Polymorphism (pol-i-mor'fizm), the property possessed by certain bodies of crystallizing in two or more forms not derivable one from the other. Thus, mercuric iodide separates from a solution in tables belonging to the dimetric system; if these crystals are heated they sublime and condense in forms belonging to the monoclinic system; carbonate of calcium exists as calcspar, which crystallizes in rhombohedral forms, and as aragonite, which crystallizes in trimetric forms.

Polynemus. See *Mango-fish.*

Polynesia (pol-i-nē′si-a; Greek, *polys*, many, *nēsos*, island), a general name for a number of distinct archipelagoes of small islands scattered over the Pacific Ocean, extending from about lat. 35° N. to 35° S., and from long. 135° E. to 100° W., the Philippines, New Guinea, Australia, and New Zealand being excluded. (See *Oceania.*) The islands are distributed into numerous groups, having a general direction from N. W. to S. E. The groups north of the equator are the Pelew, Ladrone or Marianne, Caroline, Marshall, Gilbert or Kingsmill, Fanning and Hawaii or the Sandwich Islands. South of the equator are New Ireland, New Britain, Solomon Islands, New Hebrides, Fiji, New Caledonia, Navigator, Friendly, Cook's or Harvey and the Society Islands, the Low Archipelago, the Marquesas Islands, and the isolated Easter Island. The term Polynesia is sometimes restricted to the groups most centrally situated in the Pacific; the New Hebrides, Solomon Islands, New Britain, New Ireland (Bismarck Archipelago), etc., being classed together as Melanesia, whereas the Carolines, Ladrones, Marshall Islands, etc., form Micronesia. The islands may be divided into two chief classes, volcanic and coral islands. Some of the former rise to a great height, the highest peak in the Pacific, Mauna Kea, in Hawaii, reaching 13,895 feet. The principal groups of these are the Friendly, the Sandwich, the Marquesas, and the Navigator Islands. The coral islands comprise the Carolines, Gilbert, and Marshall Islands on the northwest, and the Society Islands and Low Archipelago in the southeast, in both of which groups the *atoll* formation is very common, besides numerous other groups where coral reefs occur. The elevations of these groups do not exceed 500 feet. Polynesia has a comparatively moderate temperature, and the climate is delightful and salubrious. The predominating race, occupying the central and eastern portion of Polynesia, is of Malay origin, with oval faces, wide nostrils, and large ears. The hair and complexion vary greatly, but the latter is often a light brown. Their language is split up into numerous dialects. The other leading race is of negroid or Papuan origin, with negro-like features and crisp, mop-like hair. They are confined to Western Polynesia, and speak a different language, with numerous distinct dialects. Christianity has been introduced into a great many of the islands, and a large number of them are under the control of one or other of the European powers. Many atrocities have been practiced on the natives in recent times in connection with the luring or kidnaping of them to work in the European settlements. The commercial products consist chiefly of cocoanuts, cotton, coffee, sugar, fruits, pearls and trepang. The Ladrones were discovered by Magellan in 1521, the Marquesas by Mendaña in 1595, but it was not until 1767 that Wallis, and subsequently Cook, explored and described the chief islands. Since the natives came in contact with the whites their numbers have greatly decreased. For further information see articles on the individual groups and islands.

Polyni′ces. See *Etcocles.*

Polyp (pol′ip), a term which has been very variously and indiscriminately applied to different animals. It has thus been used to designate any animal of low organization, such as the sea-anemones, corals, and their allies; or it has been employed to indicate animals which, like the cœlenterate zoophytes or Hydrozoa, and the molluscoid Polyzoa, bear a close resemblance to plants. It is now generally applied to any single member of the class Actinozoa, represented by the sea-anemones, corals, and the like; or any member (or zoöid) of a compound organism belonging to that class. The term *polypide* is employed to designate each member or zoöid of the compound forms included in the Polyzoa. The name *polypidon* applies to the entire outer framework or skin-system of a compound form such as a hydrozoan zoophyte. The word *polypite* refers to each separate zoöid or member of a compound zoophyte or hydrozoön. The *polypary* of a hydrozoön specially refers to the horny or chitinous skin secreted by the Hydrozoa.

Polyphemus (pol-i-fē′mus), in Greek mythology, the most famous of the Cyclops, who is described as a cannibal giant with one eye in his forehead, living alone in a cave of Mount Ætna and feeding his flocks on that mountain. Ulysses and his companions having been driven upon the shore by a storm, unwarily took refuge in his cave. Polyphemus, when he returned home at night, shut up the mouth of the cavern with a large stone, and by the next morning had eaten four of the strangers, after which he drove out his flocks to pasture, and shut in the unhappy captives. Ulysses then contrived a plan for their escape. He intoxicated the monster with wine, and as soon as he fell asleep bored out his one eye with the blazing end of a

stake. He then tied himself and his companions under the bellies of the sheep, in which manner they passed safely out in the morning. Polyphemus was the despised lover of the nymph Galatea.

Polyphonic (pol-i-fon′ik), a term applied to a musical composition in two or more parts, each of which forms an independent theme, progressing simultaneously according to the laws of counterpoint, as in a fugue, which is the best example of compositions of the polyphonic class.

Polypodiaceæ (pol-i-pō-di-ā′se-ē), a natural order of ferns, which may be taken as the type of the whole. They constitute the highest order of acrogenous or cryptogamic vegetation, and are regarded as approaching more nearly to cycadaceous gymnosperms than to any other group of the vegetable kingdom. They are usually herbaceous plants with a permanent stem, which either remains buried or rooted beneath the soil, or creeps over the stems of trees, or forms a scarcely movable point of growth, round which new leaves are annually produced in a circle, or it rises into the air in the form of a simple stem, bearing a tuft of leaves at its apex and sometimes attaining the height of 40 feet, as in the tree-ferns.

Polypodium (pol-i-pō′di-um), a genus of ferns, the largest of all, comprising over 450 species, including plants of different modes of growth, and from almost all climates. They bear spore-cases on the back of the frond, distinct, ring-shaped, in roundish *sori*, destitute of *indusium*. *P. calaguala*, a native of Peru, possesses important medicinal properties, solvent, deobstruent, sudorific, etc.

Polyporus (po-lip′or-us), a genus of parasitical fungi. The *P. destructor* is one of the pests of wooden constructions, producing what is sometimes termed *dry rot*, although the true dry rot is a different plant (*Merulius lacrymans*). *P. igniarius* is known by the name of amadou, touchwood, or spunk.

Polypterus (po-lip′ter-us), a genus of fishes inhabiting the Nile, Senegal, and other rivers of Africa, and included in the Ganoid order of the class. They form types of a special family, the Polypteridæ. Their most singular characteristic is the structure of the dorsal fin, which instead of being continuous is separated into twelve or sixteen strong spines distributed along the back, each bordered behind by a small soft fin. In the young there is an external gill. The *Polypterus bichir* attains to a length of 4 feet.

Polypus (pol′i-pus), in medicine, a name given to tumors chiefly found in the mucous membranes of the nostrils, throat, ear, and uterus; rarely in the stomach, bladder, and intestines. Polypi differ much in size, number, mode of adhesion, and nature. One species is the *mucous*, *soft*, or *vesicular*, because its substance consists of mucous membrane with its embedded glands; another is called the *hard* polypus, and consists of fibrous tissue. Polypi may be malignant in character, that is, of the cancerous type. The form *polyp* is also used.

Polysyndeton (pol-i-sin′de-ton), is the name given to a figure of speech by which the conjunctive particles of sentences are accumulated, contrary to usual custom, for the purpose of giving greater emphasis to the terms connected by them, as when Schiller says, 'And it waves, and boils, and roars, and hisses.'

Polysynthetic Languages. See *Philology*.

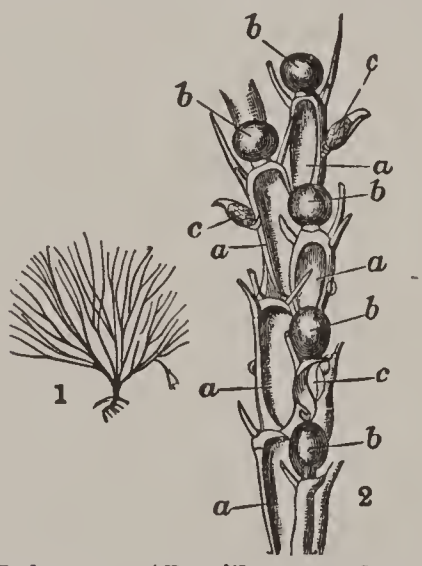
Polytechnic School. See *Ecole Polytechnique*.

Polythalamia (pol-i-thal-ā′mi-a), a group of Protozoa occupying compound chambered cells of microscopical size. In some instances each cell of the common shell presents only one external opening, but more commonly it is punctured with numerous minute pores or foramina, through which the animal can protrude filaments. Their remains constitute the bulk of the chalk and tertiary limestone. See *Foraminifera*.

Polytheism (pol-i-thē′izm; Greek, *polys*, many; *theos*, god), the belief in and worship of a plurality of gods; opposed to monotheism, the belief in and worship of one god. It is still a matter of debate whether polytheism is a primary form of human belief or the degeneration of an original monotheistic idea. It is argued, on the one hand, that the sense of personal dependence, the feeling that there was an undefined power, a mysterious *something* around and above him, did not primarily present itself to the mind of man except under a form of unity. His earliest religion would therefore be of a monotheistic character, but of a highly unstable nature, and eminently liable, among races of rude faculties and little power of abstraction, to assume a polytheistic form, the idea of one Supreme Being being readily obscured by the multiplicity of the visible operations of that being on earth. Those who affirm that polytheism

was a primary form of religious belief argue that man, ignorant of the nature of his own life, and of the nature, origin, and properties of other objects, could at first only attribute vaguely to all visible things the same kind of conscious existence as that which belonged to himself. Thus the sun, moon, and stars would all be living beings; and their influence, from the absence of any idea of a natural order, would be seen in the working of the material world and in all the accidents of human life. As being beyond human control, and as affecting the condition of men, they would be loved or feared; and with the growth of the idea that they might be propitiated or appeased the system of polytheism would be complete. See *Monotheism* and *Mythology*.

Polyzoa (pol-i-zō′a; Gr. *polys*, many; *zōon*, animal), a class of Molluscoida or Lower Mollusca, generally known by the popular names of 'sea-mosses' and 'sea-mats.' They are invariably compound, forming associated growths or colonies of animals produced by gemmation from a single primordial individual, and inhabit a *polyzoarium*, or aggregate of cells, corresponding to the polypidom of the composite hydroids.



A Polyzoon (*Bugŭla avicularia*).

1, Natural size. 2, Portion of same magnified. *a*, Cells. *b*, Ovicells. *c*, Avicularia.

The polypide, or individual polyzoön, resides in a separate cell or chamber, has a distinct alimentary canal suspended freely in a body cavity, and the reproductive organs contained within the body. The body is enclosed in a double-walled sac, the outer layer (*ectoeyst*) of which is chitinous or calcareous, and the inner (*endocyst*) a delicate, membranous layer. On the ectocyst are seen certain peculiar processes called 'bird's-head processes,' or *avicularia*, from their shape, the use of which is unknown. The mouth-opening at the upper part of each cell is surrounded by a circlet of hollow, ciliated tentacles, which perform the function of respiration, and are supported on the *lophophore;* and the cell may be closed by a sort of valve called the *epistome*. All the Polyzoa are hermaphrodite. In many cases there are *ovicells* or sacs into which the fertilized ova pass. From these proceed free-swimming ciliated embryos which develop into polypides. Continuous gemmation exists in all. The Polyzoa are classed into three groups: Ectoprocta, Entoprocta, and Aspidophora. The Ectoprocta are divided into two orders of *Phylactolæmata*, with a crescentic lophophore and an epistome; and *Gymnolæmata*, or Infundibulata, with a circular lophophore and no epistome. They are all aquatic in their habits, the marine Polyzoa being common to all seas, but the fresh-water genera are mostly confined to the north temperate zone.

Pomaceæ (po-mā′se-ē), or Po′meæ, a division of the natural order Rosaceæ, to which the apple, pear, quince, and medlar belong. It differs from Rosaceæ proper in having an inferior ovary. The fruit is always a *pome*, with a crustaceous core or bony stones.

Pombal (pom-bål′), Sebastião José Carvalho, Marquis of, a Portuguese statesman, born in 1699; died in 1782. After studying law at Coimbra, Pombal served for some time in the army. In 1739 he was appointed ambassador in London. He was recalled in 1745, and the queen sent him to Vienna to act as mediator between the pope and Maria Theresa. Under Joseph I he became secretary of state for foreign affairs. He soon rendered the king entirely subject to his influence, and proceeded to the accomplishment of his favorite objects — the expulsion of the Jesuits, the humiliation of the greater nobles, the restoration of Portugal's prosperity, and the absolute command of the state in the name of the monarch. He deprived the leading nobles of their princely possessions in the colonies, and abridged the powers of the prelacy. In 1757 he deprived the Jesuits of the place of confessors and ordered them to retire to their colleges. A conspiracy against the life of the king afforded him opportunity to banish the whole order of Jesuits from the kingdom in 1759. Pombal reorganized the army, and was active in his efforts to improve the country in every relation; he paid particular attention to education. Joseph I

died in 1777, and was succeeded by his daughter, Maria I, who immediately deprived Pombal of his offices.

Pomegranate (pom'gra-nat; *Punica granātum*, order Myrtaceæ), a dense, spiny shrub, from 8 to 20 feet high, supposed to have belonged originally to the north of Africa, and subsequently introduced into Italy. It was called by the Romans *malum Punicum*, or Carthaginian apple. The leaves are opposite, lanceolate, entire, and

Pomegranate (*Punica granātum*).

smooth; the flowers are large and of a brilliant red; the fruit is as large as an orange, having a hard rind filled with a soft pulp and numerous red seeds. The pulp is more or less acid and slightly astringent. The pomegranate is extensively cultivated throughout Southern Europe, and sometimes attains a great size. Another species (*P. nana*) inhabits the West Indies and Guiana.

Pomerania (pom-ē-rā'ni-a; German, *Pommern*), a province of Prussia, bounded by the Baltic Sea, Mecklenburg, Brandenburg, and West Prussia; area, 11,622 square miles. The coast is low and sandy and lined by numerous lagoons. The chief islands along the coast are Rügen, Usedom, and Wollin. The interior is flat and, in parts, marshy. The principal rivers are the Oder, Persante, and Stolpe. The soil is generally sandy and indifferent, but there are some rich alluvial tracts, producing a quantity of grain. Flax, hemp, and tobacco are also cultivated. Domestic animals are numerous. The forests are of large extent. Fish are abundant. There are few minerals. Manufactures include woolen and other fabrics. A considerable general and transit trade is carried on. The center of trade is Stettin, which ranks as one of the chief commercial cities of Prussia. Pomerania appears to have been originally inhabited by Goths, Vandals, and Slavs. The first mention of it in history is in 1140. It long remained an independent duchy, and in 1637, on the extinction of the ducal family, it was annexed to Sweden. On the death of Charles XII it was ceded to the electoral house of Brandenburg, with the exception of a part which subsequently was also obtained by Prussia. For administrative purposes it is divided into three governments, Stettin, Köslin, and Stralsund. Pop. (1905) 1,684,125.

Pomfret (pom'fret), JOHN, an English poet, born in 1667; died in 1703. He was rector of Maulden in Bedfordshire, and published a volume of *Poems* in 1699, one of which, *The Choice*, was long very popular. His life was written by Dr. Johnson.

Pomona (po-mō'na), among the Romans, the goddess of fruit, and wife of Vertumnus.

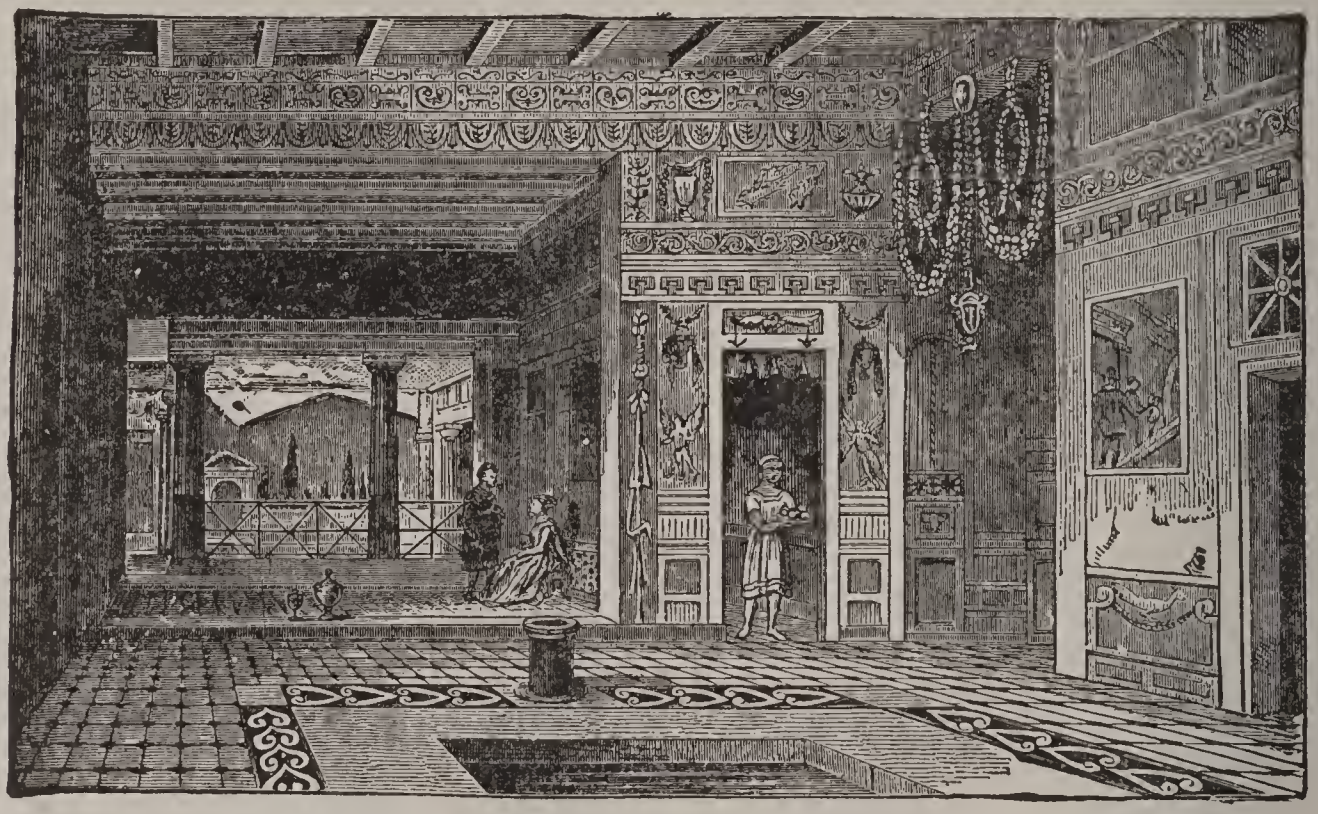
Pomona, a city of Los Angeles Co., California, 33 miles E. of Los Angeles. Its industries include fruit-raising, wine-making, pipe, planing, and iron works, etc. Pop. 10,207.

Pomona, or MAINLAND, the largest and most populous of the Orkney Islands; length from northwest to southeast, 23 miles; extreme breadth about 15 miles; area 150 square miles; pop. 17,165. It is extremely irregular in shape, and on all sides except the west is deeply indented by bays and creeks. The surface is covered in great part by moor and heath, but good pasture is also to be found, and in the valleys a good loamy soil occurs. The principal towns are Kirkwall and Stromness. See *Orkney*.

Pompadour (poṇ-på-dör), JEANNE ANTOINETTE POISSON, MARQUISE DE, the mistress of Louis XV, was born in 1721, and was said to be the daughter of the farmer-general Lenormand de Tournehem, who at his death left her an immense fortune. In 1741 she married her cousin, Lenormand d'Etiolles. A few years later she succeeded in attracting the attention of the king, and soon entirely engrossed his favor. In 1745 she appeared at court as the Marquise de Pompadour. Here she at first posed as the patroness of learning and the arts, but with the decay of her charms she devoted her attention to state affairs. Her favorites filled the most important offices, and she is said

to have brought about the war with Frederick II. She died in 1764, at the age of forty-four, hated and reviled by the nation.

Pompeii (pom-pē′yi), an ancient city of Italy, in Campania, near the Bay of Naples, about 12 miles southeast from the city of that name, and at the base of Mount Vesuvius on its southern side. Before the close of the republic, and under the early emperors, Pompeii became a favorite retreat of wealthy Romans. In A.D. 63 a fearful earthquake occurred, which destroyed a great part of the town. The work of rebuilding was soon commenced, and the new town had a population of some 30,000 when it was overtaken by another catastrophe on August 24, A.D. 79. This consisted in an eruption of Mount Vesuvius, which suddenly belched forth tremendous showers of ashes, red-hot pumice-stone, etc. These overwhelmed the city and buried it to a considerable depth. The present superincumbent mass is about 20 feet in thickness. A portion of this was formed by subsequent eruptions, but the town had been buried by the first catastrophe and entirely lost to view. Pompeii was lost in oblivion during the middle ages, and it was not until 1748, when a peasant in sinking a well discovered a painted chamber with statues and other objects of antiquity, that anything like a real interest in the locality was excited. Excavations were now prosecuted, and in 1755 the amphitheater, theater, and other parts were cleared out. Under the Bourbons the excavations were carried out on a very unsatisfactory plan. Statues and articles of value alone were extricated, while the buildings were suffered to fall into decay or were covered up again. To the short reign of Murat (1808-15) we are indebted for the excavation of the Forum, the town walls, the Street of Tombs, and many private houses. Recently the government of Victor Emmanuel assigned $12,500 annually for the prosecution of the excavations, and a regular plan has been adopted, according to which the ruins are systematically explored and carefully preserved. The town is built

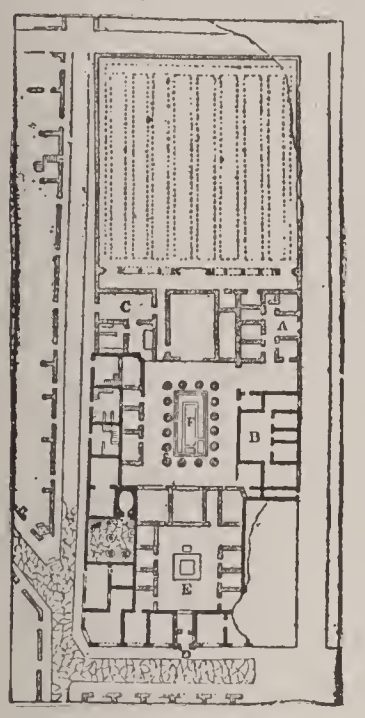


Pompeii — House of the Tragic Poet, so-called.

in the form of an irregular oval extending from east to west. The circumference of the walls measures 2925 yards. The area within the walls is estimated at 160 acres; greatest length, ¾ mile; greatest breadth, ½ mile. There are eight gates. The streets are straight and narrow and paved with large polygonal blocks of lava. The houses are slightly constructed of concrete, or occasionally of bricks. Numerous staircases prove that the houses were of two or three stories. The ground floor of the larger houses was generally occupied by shops. Most of the larger houses are entered from the street by a narrow passage (*vestibulum*) leading to an internal hall (*atrium*), which provided the surround-

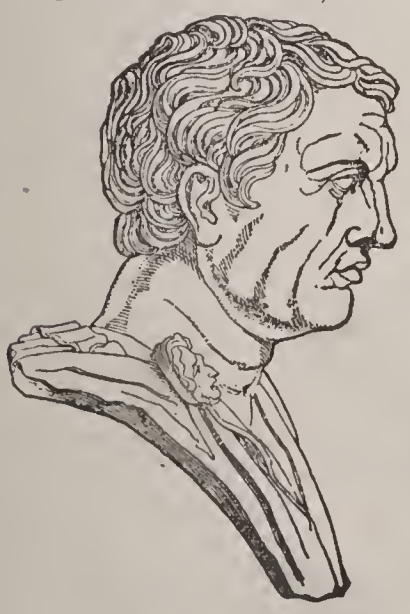
VISTA THROUGH THE ARCH OF CALIGULA, AT POMPEII

ing chambers with light and was the medium of communication; beyond the latter is another large public apartment termed the *tabulinum*. The other portion of the house comprised the private rooms of the family. All the apartments are small. The shops were small and all of one character, having the business part in front and one or two small chambers behind, with a single large opening serving for both door and window. The chief public buildings are the so-called Temple of Jupiter, the Temple of Venus, the Basilica, the Temple of Mercury, the Curia, and the Pantheon or Temple of Augustus. There are several interesting private buildings scattered through the town, including the villa of Diomedes, the house of Sallust, and the house of Marcus Lucretius. The Museum of Naples owes many of its most interesting features to the ornaments, etc., found in the public and private edifices above mentioned. The site of the city has been largely cleared. Much care is now taken for the preservation of the buildings and their contents, which are kept in place where found.



House of Pansa, Pompeii.

Pompey (pom'pi), in full CNEIUS POMPEIUS MAGNUS, a distinguished Roman, born B.C. 106, was the son of Cneius Pompeius Strabo, an able general. In B.C. 89 he served with distinction under his father in the war against the Italian allies. In the struggle between Marius and Sulla, Pompey raised three legions to aid the latter, and regained all the territories of Africa which had forsaken the interest of Sulla. This success excited the jealousy of Sulla, who recalled him to Rome. On his return Sulla greeted him with the surname of Magnus (Great). Pompey demanded a triumph, to which Sulla reluctantly consented. He entered Rome in triumph in September, 81, and was the first Roman permitted to do so without possessing a higher dignity than that of equestrian rank. After the death of Sulla, Pompey put an end to the war which the revolt of Sertorius in Spain had occasioned, and in 71 obtained a second triumph. In this year, although not of legal age and having no official experience, he was elected consul with Crassus. In 67 he cleared the Mediterranean of pirates, and destroyed their strongholds on the coast of Cilicia. In four years, 65-62, he conquered Mithridates, Tigranes, and Antiochus, king of Syria. At the same time he subdued the Jews and took Jerusalem by storm. He returned to Italy in 62 and disbanded his army, but did not enter Rome until the following year, when he was honored with a third triumph. He now, in order to strengthen his position, united his interest with those of Cæsar and Crassus, and thus formed the first triumvirate. This agreement was concluded by the marriage of Pompey with Cæsar's daughter Julia; but the powerful confederacy was soon broken. During Cæsar's absence in Gaul Pompey ingratiated himself with the senate, was appointed sole consul, and the most important state offices were filled with Cæsar's enemies. Through his influence Cæsar was proclaimed an enemy to the state, and his rival was appointed general of the army of the republic. Cæsar, alarmed by this, marched to Italy, crossed the Rubicon in 49 (see *Cæsar*), and in sixty days was master of Italy without striking a blow. Pompey crossed over to Greece, and in this country, on the plains of Pharsalia, occurred the decisive battle the result of which made Cæsar master of the Roman world. Pompey fled to Egypt, where he hoped to find a safe asylum. The ministers of Ptolemy betrayed him, and he was stabbed on landing by one of his former centurions in B.C. 48.


Pompey.— Antique Gem.

Pompey's Pillar, a celebrated column, standing on an eminence about 1800 feet to the south of the present walls of Alexandria in Egypt. It consists of a Corinthian capital, shaft, base, and pedestal. The total height of the column is 104 feet; the shaft, a monolith of red granite, is 67 feet long, and 9 feet in diameter below and not quite 8 at top. It is named from the Roman prefect Pompeius, who

erected it in honor of Diocletian about or soon after 302 A.D.

Pomponius Mela. See *Mela*.

Ponape (pō'nä-pā), one of the Caroline Islands (which see).

Ponce de Leon (pon'the de le-on'), JUAN, one of the early Spanish discoverers in America, born about 1460; died in Cuba in 1521. He accompanied Columbus on his second expedition in 1493, and was sent by Ovando to conquer the island of Porto Rico. Having there amassed great wealth, and received information of an island situated to the north, which he was made to believe contained the 'Fountain of Youth,' a fabled fount capable of conferring perpetual youth, he organized an expedition and discovered the country, to which he gave the name of Florida, though he failed to find the fountain. Ponce returned to Spain in 1513, and was appointed by Ferdinand governor of the island of Florida, as he called it, on condition that he should colonize it. In 1521 he embarked nearly all his wealth in two ships, and proceeded to take possession of his province. He was, however, met with determined hostility by the natives, who made a sudden attack upon the Spaniards, and drove them to their ships. In the combat Ponce de Leon received a wound from which he soon afterwards died.

Ponce de Leon, LUIS, a Spanish lyric poet, born in 1527, probably at Granada; died in 1591. He entered the order of St. Augustine at the age of sixteen, and became professor of sacred literature at Salamanca. He translated the *Song of Solomon* into Castilian, for which he was brought before the Inquisition at Valladolid (1572) and thrown into prison. At the end of five years he was liberated and reinstated in all his offices, and was elected head of his order. His original productions are chiefly of a religious character.

Poncho (pon'chō), a kind of cloak much worn by the South American Indians, and also by many of the Spanish inhabitants. It is a piece of thick woolen cloth of rectangular form, from 5 to 7 feet long and 3 to 4 feet broad, with a hole in the center for the head to pass through.

Pondicherry (pon-di-sher'i; French, *Pondichéry*), a town, capital of the French East Indian settlement of the same name, on the east or Coromandel coast, 85 miles south by west from Madras. Its territory is surrounded on the land side by the British district of South Arcot, and has an area of 115 square miles; pop. about 200,000. The town, with a pop. of 47,972, stands on a sandy beach, and consists of two divisions separated by a canal. The 'White Town,' or European quarter, on the east, facing the sea, is very regularly laid out, with well-built houses. The 'Black Town,' or native quarter, on the west, consists of houses or huts of brick or earth, and a few pagodas. There is an iron pier, and railway communication with the South Indian system was opened in 1879. The settlement was purchased by the French from the Bejapoor rajah in 1672 and has been repeatedly in the hands of the British.

Pondoland (pon'dō-land), a maritime territory of S. Africa, between Cape Colony and Natal, measuring about 90 miles from N. E. to S. W., and about 50 from N. W. to S. E. Pop. about 200,000. It was the last remnant of independent Kaffraria, and became a British protectorate in 1884.

Pondweed. See *Potamogeton*.

Poniatowski (pō-nē-a-tov'skē), an illustrious Polish family. STANISLAUS, Count Poniatowski, born in 1678; died in 1762, is known for his connection with Charles XII, whom he followed into Turkey. He wrote *Remarques d'un Seigneur Polonais sur l'Histoire de Charles XII, par Voltaire* (Hague, 1741).— His eldest son, S. STANISLAUS AUGUSTUS, born 1732, the favorite of Catharine II, was elected King of Poland in 1764.— JOZEF, the nephew of King Stanislaus, born in 1762, served against the Russians in 1792, and in 1794 joined the Poles in their attempt to drive the Russians out of the country, and commanded a division at the sieges of Warsaw. In 1809 he commanded the Polish army against the superior Austrian force which was sent to occupy the Duchy of Warsaw, and compelled it to retire. In 1812 he led the Polish forces against Russia. During the battle of Leipzig Napoleon created him a marshal.

Ponsard (poṇ-sär), FRANÇOIS, a French dramatist, born at Vienne, in Dauphiné, in 1814; died in 1867. His first success was his *Lucrèce*, produced in 1843, and welcomed as a return to classicism. Among his other pieces are *Agnès de Méranie*, *Charlotte Corday*, *L'Honneur et l'Argent*, etc. He became a member of the Academy in 1855.

Ponta-Delgada (pōṇ'ta-dāl-gä'da), or PONTE-DELGADA.

a seaport on the south side of the island of St. Michael, one of the Azores. It is built with considerable regularity, and the houses are substantial. A recently constructed breakwater has much improved the anchorage, and it has now an excellent harbor. The chief exports are wheat, maize, and oranges. Pop. 17,675.

Pont-à-Mousson (poṇ-tȧ-mö-sōn), a town of France, dep. of Meurthe-et-Moselle, 16 miles northwest of Nancy, on both sides of the Moselle, here crossed by a bridge. It has a handsome Gothic church dedicated to St. Martin; the old abbey of St. Mary, now converted into a seminary; a college, etc. Pop. (1906) 12,282.

Pontchartrain (pont-chär'trān), a lake of Louisiana, reaching within 5 miles of New Orleans, about 40 miles long from east to west, and nearly 25 in breadth. It is from 12 to 14 feet deep, and communicates with Lake Borgne on the east, with Lake Maurepas on the west, and by means of a canal with New Orleans on the south.

Ponte-Corvo (pon'tā-kor'vō), a town of S. Italy, province of Caserta, 20 miles southeast of Frosinone, in an isolated territory on the left bank of the Garigliano. It is the see of a bishop, has manufactures of macaroni and plastic ware, and the whole district is rich in Roman remains. It was the capital of a principality created by Napoleon I, and from which Bernadotte had his title of Prince de Ponte-Corvo. Pop. 10,518.

Pontedera (pon-tā-dā'ra), a town of Italy, province Pisa, on the Era, not far from its mouth, on the Arno; manufactures cotton goods. Pop. 7499.

Pontefract (pom'fret, or pon'te-frakt), a municipal and parliamentary borough of England, in the county and 24 miles S. S. W. of York, near the confluence of the Aire and Calder. It is well built, and has the remains of a Norman castle, which was the scene of the murder of Richard II and other atrocities. This was the last garrison to hold out for Charles I, and was dismantled in 1649. The chief manufactures are iron and brass castings, earthenware, bricks, tiles, pipes, etc.; besides considerable trade in small lozenges prepared from liquorice, known for centuries under the name of Pomfret cakes. There are large collieries in the vicinity. Pop. (1911), 15,960.

Pontevedra (pon-te-vā'*dr*ȧ), a town in Northwest Spain, capital of a province of the same name. It is surrounded by an old wall; consists of broad, well-paved streets, and well-built houses of granite, and has manufactures of cotton, velvet, woolen and cotton cloth, hats, leather, etc. Pop. 22,806.— The province produces in abundance maize, rye, wheat and millet, flax, fruit and wine, and rears great numbers of cattle. Area, 1730 square miles; pop. 457,262.

Ponthieu (poṇ-ty*eu*), an ancient county of France, in Picardie, capital Abbeville.

Pontiac (pon'ti-ak), a city, capital of Oakland Co., Michigan, on Clinton River, 26 miles N. N. W. of Detroit. It has a large woolen mill, many wagon factories, a large implement factory, and other industries, and a considerable trade in wool and produce. Many small but beautiful lakes surround it. Here is the Eastern Michigan Insane Asylum. Pop. 14,532.

Pontiac, a city, capital of Livingston Co., Illinois, on the Vermilion River, 93 miles S. S. W. of Chicago. It has manufactures of shoes, feed grinders and droppers, etc. Here is a State Reform School. Pop. 6090.

Pontianak (pon-tē-ä-näk'), the capital of the Dutch settlements on the W. coast of Borneo, at the confluence of the Landak and Kapuas, almost on the equator. It has some trade in gold dust, diamonds, sugar, rice, coffee, cotton, and edible birds'-nests. Pop. 18,000.

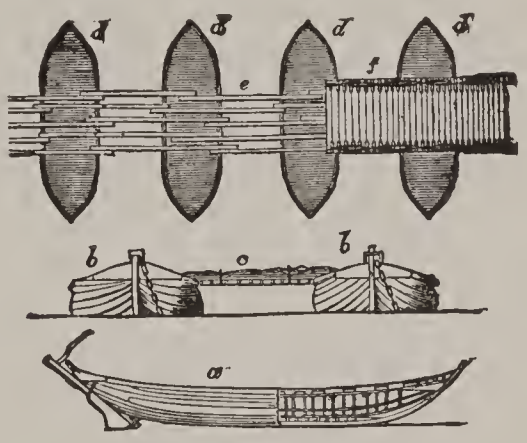
Pontifex (pon'ti-feks), among the ancient Romans a priest who served no particular divinity. The Roman pontifices formed the most illustrious among the great colleges of priests. Their institution was ascribed to Numa, and their number varied at different periods from four to sixteen. The *pontifex maximus*, or chief pontiff, held his office for life, and could not leave Italy. The emperor afterwards assumed this title until the time of Theodosius, and it subsequently became equivalent to pope.

Pontine Marshes, an extensive marshy tract of land in Italy, in the S. part of the Roman Campagna, extending along the shores of the Mediterranean for about 24 miles, with a mean breadth of 7 miles. The Romans, by the construction of the Appian way and by means of canals, laid a considerable part of them dry, and many of the popes engaged in the drainage and reclaiming of the marshes. But notwithstanding all these labors, now completely abandoned, the air of this region is far from being salubrious, and the vast tract is inhabited by a scanty

population of husbandmen and shepherds, who, if possible, spend only a part of the year here.

Pontoise (poṇ-twäz), a town in France, department of Seine-et-Oise, at the confluence of the Viosne with the Oise. It has manufactures of chemical products, hosiery, etc. Pop. (1906) 7963.

Pontoon (pon'tön'), in military engineering, a flat-bottomed boat, or any light framework or floating body used in the construction of a temporary bridge over a river. One form of pontoon is a hollow tin-plate cylinder, with hemispherical ends, and divided by several longitudinal and transverse partitions to act as braces and to prevent sinking if pierced by a shot or by accident. Another is in the form of a decked canoe, and consists of a timber



Pontoon and Pontoon Bridge.

a, Pontoon, external and internal structure. *b b*, End of same, supporting the roadway. *c*, Plan of bridge. *d d*, Pontoons. *e*, Rafters for supporting the roadway. *f*, Roadway complete.

frame covered with sheet copper. It is formed in two distinct parts, which are locked together for use and dislocated for transportation, and is also divided into air-tight chambers. The name is also given to a water-tight structure or frame placed beneath a submerged vessel and then filled with air to assist in refloating the vessel; and to a water-tight structure which is sunk by filling with water and raised by pumping it out, used to close a sluice-way or entrance to a dock.

Pontoppidan (pon-top'pē-dan), Erik, a Danish writer, born in 1698; died in 1764. He became preacher to the court in 1735, and soon after professor of theology in Copenhagen. In 1747 he was made bishop of Bergen, and 1755 chancellor of Copenhagen University. Pontoppidan wrote several works of historical and scientific interest, including *Natural History of Norway*, *Annals of the Danish Church*, etc.

Pontus (pon'tus), a kingdom in Asia Minor (so-called from the Pontus Euxinus, on which it lay), which extended from Halys on the west to Colchis on the east, and was bounded on the north by the Euxine Sea, and on the south by Galatia, Cappadocia and Armenia Minor. The first king was Artabazes, son of Darius. The kingdom was in its most flourishing state under Mithridates the Great. But soon after his death (B.C. 63) it was conquered by Cæsar, and made tributary to the Roman Empire. In 1204 Alexius Comnenus founded a new kingdom in Pontus, and in 1461 Mohammed II united it with his great conquests.

Pontus Euxi'nus, the ancient name for the Black Sea (which see).

Pontypool (pon'ti-pöl), a town and important railway center of England, in the county and 15½ miles southwest of Monmouth. The greater portion of the population is employed in ironworks and forges and works for making tin-plate. Pop. 6126.

Pontyprydd (pont-ē-prith'), a town of South Wales, in Glamorganshire, at the confluence of the Rhondda with the Taff. It has rapidly increased in recent times owing to the adjacent coal and iron mines. Pop. (1911), 43,215.

Pony (pō'ni), a term applied to the young of the horse and also to several subvarieties or races of horses, generally of smaller size than the ordinary horses, and which are bred in large flocks and herds in various parts of the world, chiefly for purposes of riding and of lighter draught work. Among well-known breeds are the Welsh, Shetland, Iceland, Canadian, etc.

Poodle (pö'dl), a small variety of dog covered with long, curling hair, and remarkable for its great intelligence and affection. The usual color is white, but black and blue, if good in other points, are highly valued.

Poole (pöl), a seaport of England, county of Dorset, on the north part of Poole Harbor, an ancient place. The old town is being surrounded by handsome suburbs at a rapid rate, and there are many fine public buildings. The manufactures consist chiefly of cordage and sail-cloth; there are also potteries, large flour-mills, and two iron foundries. The harbor is large and commodious, with excellent quays and extensive warehouses. The chief exports are clay for the Staffordshire potteries,

and manufactured clay goods. Pop. 38,886.

Poole, MATTHEW, the compiler of the *Synopsis Criticorum Biblicorum*, was born at York about 1624; died at Amsterdam in 1679. He studied at Emmanuel College, Cambridge, and took orders. In 1662 he was ejected by the Act of Uniformity from his church of St. Michael-le-Querne in London, and subsequently retired to Holland. He devoted ten years to his *Synopsis*, which is an attempt to condense into one work all biblical criticisms written previous to his own times.

Poole, WILLIAM FREDERICK, bibliographer, was born at Salem, Massachusetts, in 1821; died in 1894. He was a librarian in Cincinnati, Boston, and Chicago. His chief work is his very useful *Index to Periodical Literature*.

Poonac (pö'nuk), the substance left after cocoanut oil is expressed from the nuts, used as manure and for feeding stock.

Poonah (pö'na), or PUNA, a city and district of Hindustan, in the presidency of Bombay. It is about 119 miles east of Bombay by the Great Indian Peninsular Railway. The city is well built, and has the Deccan college for classics, mathematics, and philosophy, and a college of science with special training in civil engineering, also training college, female normal school, and other schools, public library, hospital, arsenal, barracks, etc. It was the capital of the Peishwa, or head of the Mahratta confederacy. It is a health resort, and for part of the year the seat of the Bombay government. Manufactures include gold and silver jewelry, small ornaments in brass, copper, and ivory, and silk and cotton fabrics. It is an important military station (the cantonments lying to the north of the town), and good roads connect it with Bombay, Ahmednagar, Sattarah, etc. Pop. 153,320, of whom 30,129 are in the cantonments.—The district has an area of 5348 sq. miles, and a pop. of 995,330. It is an elevated tableland, watered by the Bhima and its tributaries, and abounding in isolated heights, formerly crowned with very strong fortresses. The inhabitants chiefly are Mahrattas.

Poon (pön), or POONA WOOD, is the wood of the poon tree (*Calophyllum inophyllum* and *Calophyllum angustifolium*), a native of India. It is of a light, porous texture and is much used in the East Indies in shipbuilding for planks and spars. The Calcutta poon is preferred to that of other districts. Poon seed yields an oil called *dilo*, poon-seed oil, etc.

Poop (pöp), the aftermost and highest part of the hull in large vessels; or, a partial deck in the aftermost part of a ship above the deck proper.

Poor (pör), those who lack the means necessary for their subsistence. At no period in the history of the world, and among no people, can there be said to have existed no poor, and probably in all civilized communities some provision, however inadequate, has been made for their support. In Rome, in its earlier days at least, the contest between the plebeians and patricians partook very much of the nature of a struggle between poverty and riches, and in later times corn or bread was often doled out free to needy citizens. During the middle ages the great majority of the people were maintained in a state of bondage by their feudal superiors, and many freemen, in order to avoid destitution, surrendered their liberty and became serfs. In all the countries of modern Europe laws have been enacted relative to the maintenance of the poor. In England, up to the time of Henry VIII, the poor subsisted entirely on private benevolence. Numerous statutes were passed in the reign of Henry VIII and following reigns to provide for the poor and 'impotent,' but these were far from sufficient and other measures were adopted, overseers of the poor being appointed in 1601 in every parish. Their chief duties were: first, to provide for the poor, old, impotent; and, secondly, to provide work for the able-bodied out of employment. For these purposes they had power to levy rates on the inhabitants of the parish. This Elizabethan act is the basis of the present English poor-law system. The statute of 1601 was modified by a law of Charles II in 1662 and from this period till 1834 the administration of relief was entrusted to the church wardens and inspectors. The working of these laws was attended with numerous abuses, and in 1834 the Poor Law Amendment Act was passed, which with some more recent statutes forms the legislation in actual operation at the present day.

A legal claim to relief exists in most of the northern European countries, but in others no such edict as a poor law exists. Poor laws in the United States are of local enactment. General laws have been passed by some of the states, but town authorities usually adopt regulations for the care of the poor. Several states have passed what are called 'tramp laws,' making it a criminal of-

fense for the class of paupers generally styled 'tramps' to wander through the state without 'visible means of support.' In some states the farming out of the town poor to the lowest bidder is still practiced. The town in which a pauper has legal settlement is required to support him.

Pooree (pö'rē), or PURI, commonly called JUGGERNAUT, a town in the province of Orissa (India). The town is 250 miles S. W. from Calcutta, and 595 miles N. of Madras. It contains the shrine of Juggernaut, to whose worship crowds flock from every part of India. Pop. about 30,000.

Poore (pör), BENJAMIN PERLEY, journalist, was born near Newburyport, Massachusetts, in 1820. His lifework was that of Washington correspondent. His letters to the *Boston Journal* and to other papers gained him a national reputation by their trustworthy character. He was an industrious collector of historical matter, and published several works, some of which had large circulation. In 1867 he began to edit the *Congressional Directory;* brought out the annual abridgment of the public documents for many years; also made a compilation of United States treaties with different countries. He died in 1887.

Popayan (pō-pa-yän'), a city of Colombia, and capital of the state of Cauca, situated near the river Cauca, and 228 miles S. W. of Bogotá. It is the see of a bishop, and has a university, a cathedral, a hospital, and other public buildings. In 1834 it was nearly destroyed by an earthquake. Pop. (1906 estimate) 10,000.

Pope (pōp; Latin *papa*, Greek, *papas*, father), the title given to the head of the Roman Catholic hierarchy. It seems to have been used at first in the early church as a title of reverence given to ecclesiastics generally, and at the present time it is applied in the Greek Church to all priests. In the early Western Church the title of pope was ultimately bestowed upon the metropolitan bishops, but in the struggle for pre-eminence the claim to be recognized as the only pope was enforced by the Bishop of Rome. This claim of preëminence was founded on the belief, supported by the early traditions of the church, that the Apostle Peter planted a church in Rome, and that he died there as a martyr. This tradition, taken in connection with the alleged preëminence of Peter among Christ's disciples, came to be regarded as sufficient reason for the primacy of the Bishop of Rome in the church. Consequently from the very earliest times the Bishop of Rome was the first among the five patriarchs or superior bishops of Christendom. A decree of the emperor Valentian III (445) acknowledged the Bishop of Rome as primate, but until the eighth century many measures of the popes met with violent opposition. Leo the Great (440-461) did not fail to base his claims to the primacy on divine authority by appealing to Matt., xvi, 18; and he did much to establish the theory that bishops in disputes with their metropolitans had a right of appeal to Rome. The Eastern Church early resisted the see of Rome, and this mainly occasioned the schism that in 1054 divided Christendom into the Greek and Latin Churches. Non-Catholics allege that several circumstances contributed to open to the popes the way to supreme control over all churches. Among these they cite the establishment of missionary churches in Germany directly under Rome, the pseudo-Isidorian decretals, which contained many forged documents supporting the general supremacy of the Roman pontiff, the gradations of ecclesiastical rank, and the personal superiority of some popes over their contemporaries. Leo the Great (440-461), Gregory I, the Great (590-604), and Leo III (795-816), who crowned Charlemagne, all increased the authority of the papal title. Much violence and politics marked papal elections in the tenth and eleventh centuries. In 1059 the dignity and independence of the papal chair were heightened by the constitution of Nicolas II, placing the right of election of the pope in the hands of the cardinals. In 1073 Gregory VII, at a Roman council, formally prohibited the use of the title of pope by any other ecclesiastic than the Bishop of Rome; he also enforced a celibate life upon the clergy, and prohibited lay investiture. The reign of Innocent III (1198-1216) raised the papal see to the highest degree of power and dignity; and having gained almost unlimited spiritual dominion, the popes now began to extend their temporal power also. The dominions under the pope's temporal rule had at first consisted of a territory granted to the papal see by Pepin in 754, which was subsequently largely increased. The popes, however, continued to hold to some extent the position of vassals of the German Empire, and until the twelfth century the emperors would not permit the election of a pope to take place without their sanction. Innocent III, however, largely increased his territories at the expense of the empire, and the power

of the emperors over Rome and the pope may now be said to have come to an end. Favorable circumstances had already made several kingdoms tributary to the papal see, which had now acquired such power that Innocent III was enabled both to depose and to proclaim kings, and put both France and England under an interdict. France was the first to resist successfully the papal authority. In Philip the Fair Boniface VIII found a political superior, and his successors from 1307 to 1377 remained under French influence, and held their courts at Avignon. Their dignity sunk still lower in 1378, when two rival popes appeared, Urban VI and Clement VII, causing a schism and scandal in the church for thirty-nine years. This schism did much to lessen the influence of the popes in Christendom, and it subsequently received a greater blow from the Reformation. During the reign of Leo X (1513-25) Luther, Zuinglius and Calvin were the heralds of an opposition which separated almost half the West from the popes, while the policy of Charles V was at the same time diminishing their power, and from this time neither the new support of the Society of Jesuits nor the policy of the popes could restore the old authority of the papal throne. The national churches obtained their freedom in spite of all opposition, and the Peace of Westphalia (1648), bringing to an end the Thirty Years' war and the religious struggle in Germany, gave public legality to a system of toleration which was in direct contradiction to all earlier conduct. The bulls of the popes were now no longer of avail beyond the states of the church without the consent of the sovereigns, and the revenues from foreign kingdoms decreased. Pius VI (1775-99) witnessed the revolution which not only tore from him the French Church, but even deprived him of his dominions. In 1801, and again in 1809, Pius VII lost his liberty and possessions, and owed his restoration in 1814 to a coalition of temporal princes, among whom were two heretics (English and Prussian) and a schismatic (the Russian). Nevertheless he not only restored the Inquisition, the order of the Jesuits, and other religious orders, but advanced claims and principles entirely opposed to the ideas and resolutions of his liberators. The same spirit that actuated Pius VII actuated in like manner his successors, Leo XII (1823-29), Pius VIII (1829-30), and above all Gregory XVI (1831-46). The opposition of the latter to all changes in the civil relations of the papal dominions contributed greatly to the revolution of 1848, which obliged his successor, Pius IX, to flee from Rome. The temporal power of the papacy was further weakened by the events of 1859, 1860, and 1866. And after the withdrawal of the French troops from Italy in 1870, King Victor Emmanuel took possession of Rome, and since that time the pope has lived in almost complete seclusion in the Vatican.

By the decrees of the Vatican Council of 1870 the pope has supreme power in matters of discipline and faith over all and each of the pastors and of the faithful. It is further taught by the Vatican Council that when the pontiff speaks *ex cathedra*, that is, when he, in virtue of his apostolic office, defines a doctrine of faith and morals to be held by the whole church, he possesses infallibility by divine assistance. The pope cannot annul the constitution of the church as ordained by Christ. He may condemn or prohibit books, alter the rites of the church, and reserve to himself the canonization of saints. A pope has no power to nominate his successor, election being entirely in the hands of the cardinals, who are not bound to choose one of their own body. The papal insignia are the tiara or triple crown, the straight crosier, and the pallium. He is addressed as 'Your holiness.'

We subjoin a table of the popes, according to the Roman Notizie, with the dates of the commencement of their pontificates. The names printed in italics are those of anti-popes: —

St. Peter ..A.D.	42	St. Marcellinus. ..... A.D.	296
St. Linus	66	(See vacant 3 years and 6 months.)	
St. Anacletus ..	78	St. Marcellus I.	308
St. Clement I .	91	St. Eusebius ..	310
St. Evaristus ..	100	St. Melchiades or Miltiades ...	311
St. Alexander I	108	St. Sylvester I	314
St. Sixtus I ...	119	St. Marcus ...	336
St. Telesphorus.	127	St. Julius I ..	337
St. Hyginus ...	139	Liberius	352
St. Pius I	142	St. Felix II (sometimes reckoned an Anti-pope) ..	355
St. Anicetus ...	157	St. Damasus I .	366
St. Soterus	168	St. Siricius ...	384
St. Eleutherius.	177	St. Anastasius I	398
St. Victor I ...	193	St. Innocent I .	402
St. Zephirinus .	202	St. Zosimus ...	417
St. Callixtus I .	217	St. Boniface I— *Eulalius*	418
St. Urban I ...	223	St. Celestine I .	422
St. Pontianus ..	230	St. Sixtus III .	432
St. Anterus ...	235	St. Leo I the Great	440
St. Fabian	236	St. Hilary	461
St. Cornelius ..	250		
St. Lucius I— *Novatianus* ..	252		
St. Stephen I ..	253		
St. Sixtus II ..	257		
St. Dionysius ..	259		
St. Felix I	269		
St. Eutychianus.	275		
St. Caius	283		

St. Simplicius . 468
St. Felix III .. 483
St. Gelasius I . 492
St. Anastasius II 496
St. Symmachus. 498
St. Hormisdas—*Lawrence* ... 514
St. John I 523
St. Felix IV . 526
Boniface II—*Dioscorus* 530
John II 533
St. Agapetus I . 535
St. Sylverius .. 536
Vigilius 537
Pelagius I 555
John III 560
Benedict (1) Bonosus 574
Pelagius II 578
St. Gregory I the Great .. 590
Sabinianus 604
Boniface III .. 607
St. Boniface IV 608
St. Deusdedit . 615
Boniface V ... 619
Honorius I 625
(See vacant 1 year and 7 months.)
Severinus 640
John IV 640
Theodorus I ... 642
St. Martin I .. 649
St. Eugenius I . 654
St. Vitalianus . 657
Adeotatus 672
Donus or Domnus I 676
St. Agathon ... 678
St. Leo II 682
St. Benedict II . 684
John V 685
Conon — *Theodorus; Paschal* 686
St. Sergius I .. 687
John VI 701
John VII 705
Sisinnius 708
Constantine ... 708
St. Gregory II . 715
St. Gregory III 731
St. Zachary ... 741
Stephen II (died before consecration) 752
Stephen III ... 752
St. Paul I—*Constantine; Theophylactus; Philip* 757
Stephen IV ... 768
Adrian I 772
St. Leo III .. 795
Stephen V 816
St. Paschal I . 817
Eugenius II .. 824
Valentinus ... 827
Gregory IV ... 827
Sergius II 844
St. Leo. IV .. 847
Benedict III—*Anastasius* .. 855
St. Nicholas I . 858
Adrian II 867
John VIII 872
Marinus I; or Martin II ... 882
Adrian III 884
Stephen VI ... 885
Formosus 891
Boniface VI (reigned only 18 days) ... 896
Stephen VII ... 896
Romanus 897
Theodorus II—*Sergius III* . 898
John IX 898
Benedict IV .. 900
Leo V 903
Christopher ... 903
Sergius III .. 904
Anastasius III . 911
Lando 913
John X 914
Leo VI 928
Stephen VIII .. 929
John XI 931
Leo VII 936
Stephen IX ... 939
Marinus II; or Martin III .. 943
Agapetus II .. 946
John XII—*Leo VIII* 956
Benedict V ... 964
John XIII 965
Benedict VI .. 972
Donus or Domnus II 974
Benedict VII .. 975
John XIV—*Boniface VII* ... 983
John XV 985
Gregory V—*John XVI* ... 996
Sylvester II ... 999
John XVI or XVII 1003
John XVII or XVIII 1003
Sergius IV ... 1009
Benedict VIII—*Gregory VI* . 1012
John XVIII or XIX 1024
Benedict IX (deposed)—*John XX* 1033
Gregory VI—*Sylvester III* 1045
Clement II ... 1046
Damasus II—*Benedict IX* attempts to resume the throne 1048
St. Leo IX .. 1049
Victor II 1055
Stephen X ... 1057
Benedict X ... 1058
Nicholas II ... 1058
Alexander II—*Honorius II* 1061
Gregory VII (Hildebrand)—*Clement III* 1073
(See vacant 1 year.)
Victor III 1086
Urban II 1088
Paschal II ... 1099
Gelasius II—*Gregory VIII* 1118
Callixtus II ... 1119
Honorius II—*Celestine II* . 1124
Innocent II—*Anacletus II; Victor IV* .. 1130
Celestinus II . 1143
Lucius II 1144
Eugenius III . 1145
Anastasius IV . 1153
Adrian IV (Nicholas Breakspear, an Englishman) . 1154
Alexander III—*Victor V; Paschal III; Callixtus III; Innocent III* .. 1159
Lucius III ... 1181
Urban III 1185
Gregory VIII . 1187
Clement III .. 1187
Celestinus III . 1191
Innocent III .. 1198
Honorius III .. 1216
Gregory IX .. 1227
Celestinus IV . 1241
(See vacant 1 year and 7 months.)
Innocent IV ... 1243
Alexander IV . 1254
Urban IV 1261
Clement IV ... 1265
(See vacant 2 years and 9 months.)
Gregory X 1271
Innocent V 1276
Adrian V 1276
John XIX or XX or XXI .. 1276
Nicholas III .. 1277
Martin IV 1281
Honorius IV .. 1285
Nicholas IV .. 1288
(See vacant 2 years and 3 months.)
St. Celestinus V 1294
Boniface VIII . 1294
Benedict XI .. 1303
Clement V (papacy removed to Avignon) . 1305
(See vacant 2 years and 3 months.)
John XXII ... 1316
Benedict XII—*Nicholas V at Rome* 1334
Clement VI ... 1342
Innocent VI ... 1352
Urban V—*Clement VII* 1362
Gregory XI (throne restored to Rome) 1370
Urban VI 1378
Boniface IX—*Benedict XIII at Avignon* .. 1389
Innocent VII .. 1404
Gregory XII .. 1406
Alexander V .. 1409
John XXIII .. 1410
Martin V—*Clement VIII* 1417
Eugenius IV—*Felix V* 1431
Nicholas V ... 1447
Callixtus III .. 1455
Pius II 1458
Paul II 1464
Sixtus IV 1471
Innocent VIII . 1484
Alexander VI .. 1492
Pius III 1503
Julius II 1503
Leo X 1513
Adrian VI 1522
Clement VII .. 1523
Paul III 1534
Julius III 1550
Marcellus II .. 1555
Paul IV 1555
Pius IV 1559
St. Pius V 1566
Gregory XIII . 1572
Sixtus V 1585
Urban VII 1590
Gregory XIV .. 1590
Innocent IX .. 1591
Clement VIII .. 1592
Leo XI 1605
Paul V 1605
Gregory XV ... 1621
Urban VIII ... 1623
Innocent X ... 1644
Alexander VII . 1655
Clement IX ... 1667
Clement X 1670
Innocent XI ... 1676
Alexander VIII 1689
Innocent XII .. 1691
Clement XI .. 1700
Innocent XIII . 1721
Benedict XIII . 1724
Clement XII .. 1730
Benedict XIV . 1740
Clement XIII . 1758
Clement XIV . 1769
Pius VI 1775
Pius VII 1800
Leo XII 1823
Pius VIII 1829
Gregory XVI . 1831
Pius IX 1846
Leo XIII 1878
Pius X 1903

ALEXANDER POPE

Pope, Alexander, a celebrated English poet, was born at London in 1688. His father was a London merchant and a devout Catholic. Soon after his son's birth the father retired to Binfield, near Windsor. Pope was small, delicate, and much deformed. His education was a desultory one. He picked up the rudiments of Greek and Latin from the family priest, and was successively sent to two schools, one at Twyford, the other in London. He was taken home at the age of twelve, received more priestly instruction, and read so eagerly that his feeble constitution threatened to break down. Before he was fifteen he attempted an epic poem, and at the age of sixteen his *Pastorals* procured him the notice of several eminent persons. In 1711 he published his poem the *Essay on Criticism*, which was followed by *The Rape of the Lock*, a polished and witty narrative poem founded on an incident of fashionable life. His next publications were *The Temple of Fame*, a modernization and adaptation of Chaucer's *House of Fame; Windsor Forest*, a pastoral poem (1713); and *The Epistle of Eloisa to Abelard* (1717). From 1713 to 1726 he was engaged on a poetical translation of Homer's works, the *Iliad* (completed in 1720) being wholly from his pen, the *Odyssey* only half. The pecuniary results of these translations showed a total profit of nearly $45,000. In 1728 he published his *Dunciad*, a mock-heroic poem intended to overwhelm his antagonists with ridicule. It is distinguished by the excessive vehemence of its satire, and is full of coarse abuse. This was followed by *Imitations of Horace* (among the most original of his works), and by *Moral Epistles or Essays*. His *Essay on Man* was published anonymously in 1733, and completed and avowed by the author in the next year. This work is distinguished by its poetry rather than by its reasonings, which are confused and contradictory. In 1742 he added a fourth book to his *Duneiad*, in which he attacked Colley Cibber, then poet-laureate. He died in 1744, and was interred at Twickenham. Pope was vain and irascible, and seems to have been equally open to flattery and prone to resentment; yet he was kindhearted and stanch to his friends, among whom he reckoned Swift, Arbuthnot, and Gay. His great weakness was a disposition to artifice in order to acquire reputation and applause. As a poet, no English writer has carried further correctness of versification. A large number of his letters were published in his own lifetime. There are various editions of Pope's works, the best being that by the Rev. W. Elwin and W. J. Courthope.

Pope, John, soldier, born at Louisville, Kentucky, in 1822; died in 1892. He was graduated from West Point in 1842, served in Florida and in the Mexican war, and was appointed brigadier-general of volunteers in the Civil war. He captured New Madrid and Island No. 10 in the spring of 1862, and in June was given the command of the Army of the Potomac. His army suffered a severe defeat by Lee and Jackson August 29 and 30, 1862. He resigned his command, and was afterwards employed against the Indians in Minnesota. After the war he was put in command of several military departments.

Poperinghe (pō-per-aṇ), a town in Belgium, province West Flanders, with some trade in hops and hemp. It has manufactures of woolens, lace, linen, pottery, etc. Pop. 11,552.

Popish Plot, an imaginary conspiracy which Titus Oates pretended to have discovered in 1678, and by which he succeeded in deluding the mind of the nation over a space of two years, and causing the death of many innocent Catholics. Oates alleged that the plot was formed by the Jesuits and Roman Catholics for the purpose of murdering the king, Charles II, and subverting the Protestant religion. Godfrey, a justice of the peace to whom Oates gave evidence, was found dead in a ditch (Oct. 17, 1678), and the papists were accused of his murder, though nothing transpired to substantiate the charge. Parliament met soon afterwards, and the Commons passed a bill to exclude the Catholics from both houses. Oates received a pension, and this encouraged Bedloe, a noted thief and impostor, to come forward and confirm Oates's statements. He also accused several noblemen by name of a design to take up arms against the king. Coleman, secretary to the Duchess of York, a Jesuit named Ireland, and others were tried, condemned, and executed on the testimony of Oates and Bedloe. In 1680 Viscount Stafford was impeached by the Commons, condemned by the Lords, and executed (Dec. 29) as an accomplice of the plot, on the evidence of Oates and two of his associates. Soon after the accession of James II (1685) Oates was convicted of perjury and other crimes. See *Oates*.

Poplar (pop'lar; *Populus*), a well-known genus of hardy deciduous trees, nat. order Salicaceæ, with both barren and fertile flowers in catkins, stamens four to thirty, leaves alternate, broad, with long and slender foot-stalks

flattened vertically, the leaves having generally more or less of a tremulous motion. About eighteen species have been observed, natives of Europe, Central and Northern Asia and North America. Some of the poplars are the most rapid growers of all hardy forest trees. They thrive under a variety of conditions as regards soil, etc., but do best in damp situations. The timber of the poplar is white, light, and soft, and not very valuable. *P. fastigiāta*, the common Lombardy poplar, is well known as a tall tree with slender branches almost upright; it reaches a height of 100 to 150 feet. *P. nigra* is the common black poplar. *P. trcmŭla* is the aspen. *P. alba*, the white poplar, often attains a height of 100 feet. *P. balsamifĕra* is the balsam-poplar or tacamahac of the United States; *P. monilifĕra*, the cottonwood of the United States; *P. candicans*, the Ontario poplar.

Poplar Bluff, a city, capital of Butler Co., Missouri, 73 miles s. w. of Cairo, Illinois. It has an extensive stock yard and a large shipping business, with various wood-working factories. Pop. 6916.

Poplin (pop'lin), a kind of finely woven fabric, made of silk and worsted. In the best poplins the warp is of silk and the weft of worsted, a combination which imparts peculiar softness and elasticity to the material; in the cheaper makes cotton and flax are substituted for silk, which produces a corresponding deterioration in the appearance of the stuff. The manufacture of poplin was introduced into Ireland from France in 1775 by Protestant refugees, and Ireland is still famous for its production.

Popocatepetl (po-pō-ka-tā'pet'l, or -tā-pet'l; Aztec, *popoca*, to smoke, and *tepctl*, a mountain), an active volcano in Mexico, in the province of Puebla; lon. 98° 33′ w.; lat. 18° 36′ N. Its height has been estimated at 17,884 feet. The crater is 3 miles in circumference and 1000 feet deep. Forests cover the base of the mountain, but its summit is mostly covered with snow.

Poppy (pop'i), the common name for plants of the genus *Papāver*, type of the order Papaveraceæ. The species of poppy are herbaceous plants, all bearing large, brilliant, but fugacious flowers. The white poppy (*P. somnifĕrum*) yields the well-known opium of commerce. (See *Opium.*) Most of the species are natives of Europe. They often occur as weeds in fields and waste places, and are frequently also cultivated in gardens for ornament. The seeds of the white poppy yield a fixed harmless oil employed for culinary purposes; and the oil-cake is used for feeding cattle. The roots of the poppy are annual or perennial; the calyx is composed of two leaves, and the corolla of four petals; the stamens are numerous, and the capsule is one-celled, with several longitudinal partitions, and contains a multitude of seeds.

Population (pop-ū-lā'shun). The power of propagation inherent in all organic life may be regarded as practically infinite. There is no one species of vegetable or animal which, under favorable conditions as to space, climate, and food (that is to say, if not crowded and interfered with by others), would not in a small number of years overspread every habitable region of the globe. To this property of organized beings the human species forms no exception. And it is a very low estimate of its power of increase if we assume only that, under favorable conditions, each generation might be double the number of the generation which preceded it. Taking mankind in the mass, the individual desire to contribute to the increase of the species may be held to be universal, but the actual growth of population is nowhere left to the unaided force of this motive, and nowhere does any community increase to the extent of its theoretical capacity, even though the growth of population has come to be commonly considered as an indispensable sign of the prosperity of a community. For one thing, population cannot continue to increase beyond the means of subsistence, and every increase beyond actual or immediately attainable means must lead to a destruction of life. But if population is thus actually limited by the means of subsistence, it cannot be prevented by these means from going further than these means will warrant; that is to say, it will only be checked or arrested after it has exceeded the means of subsistence. It becomes then an inquiry of great importance by what kind of checks population is actually brought up at the point at which it is in fact arrested. This inquiry was first systematically treated in an *Essay on the Principle of Population*, published in 1798 by the Rev. T. R. Malthus. (See *Malthus.*) Malthus points out that population increases in a geometrical while the means of subsistence increase only in an arithmetical ratio. And in examining the bearing on each other of the different ratios of increase of human life, and of the means of supporting it, he has deduced a law to the proof of which a considerable por-

tion of his work is devoted. This law is that the energy of reproduction rises above all the ordinary accidents of human life, and the inevitable restraints imposed by the various organizations of human society, so that in all the various countries and climates in which men have lived, and under all the constitutions by which they have been governed, the normal tendency of population has always been to press continuously upon the means of subsistence. Malthus divides the checks on the increase of population into two classes, preventive and positive; the one consisting of those causes which prevent possible births from taking place, the other of those which, by abbreviating life, cut off actual excesses of population. In a further analysis of these checks he reduces them to three — vice, misery, and moral restraint. The proof of his main position is historical and statistical. In regard to the subsidiary inquiry, the most striking point brought out is the rarity of moral restraint and the uniform action, in innumerable forms, of vice and misery. In order that the latter should be weakened in their action, and the former strengthened, it is desirable to have the general standard of living in a community raised as high as possible, and that all may look to the attainment of a position of comfort by the exercise of prudence and energy. In an article read before the Académie des Sciences of Paris in 1887, by M. Levasseur, the following figures were quoted showing the density of population in the great divisions of the world: —

	Area in thousands of sq. miles.	Pop. in millions.	Density per sq. mile.
Europe	3,861	347	90
Africa	12,124	197	16
Asia	16,217	789	47
Oceania	4,247	38	9
N. America ..	9,035	100	8·8
S. America ..	7,066	32	4·6

It may be stated that the conclusion reached by Malthus has been vigorously contested, on various grounds, and still more important is the fact that the story of the human race, since his period, does not sustain his argument. The restraints upon increase imposed by human society are much greater in effect than he estimated. It is true that the population of the earth, and especially of Europe, has made a very great increase within a century past, reaching by the opening of the twentieth century the great total of about 1,500,000,000. The effects of war, pestilence and famine have been very largely eliminated, and medical science has to-day reached a stage of development that goes far to remove one of the great checks to increase of population. But this growth in numbers has been accompanied by a greater increase in the means of subsistence and the people of to-day live in superior comfort and security, and with a considerably longer span of life, than their ancestors of a century ago. Moreover, the food-raising capacity of the earth is increasing at an encouraging rate, and no one can predict to what a high level it may reach in the future. Despite this, however, the limit of comfortable life would certainly be reached and passed were there not a falling off in fecundity as a result of modern conditions of society, that seems likely to operate as an effective check to a serious overplus of population. In recent decades the birth-rate has been falling off in all progressive countries in a very significant manner. This is indicated in various parts of Europe, and in France has reached such a level that there is an actual decrease of population. A similar condition exists elsewhere. Thus in Massachusetts, from 1883 to 1897, the birth-rate of native married women was only five-ninths of that of women of foreign birth, a fact due probably to their superior condition of life. Several causes lead in this direction. It is well known that any stratum of population that is hopeless of bettering its condition is very apt to breed recklessly, and this fact has kept such countries as China and India at or near the starvation limit for generations past. But where comfort exists through the great bulk of a population and the prospect of better conditions leads to the exercise of prudence and restraint, there is sure to be a falling off in the birth-rate. In this the opening of widespread industrial careers to women aids. Later marriages take place, celibacy increases, care is taken to prevent the birth of an undue number of children, and other influences act to reduce the birth-rate. For these reasons it would appear that, when prosperity extends widely over the earth, the increase of population seems sure to decline, while the development of the food supply promises a steady enhancement of the conditions of human comfort and prosperity.

Porbandar (por-bun'dur), a town of India, chief town of a native state of the same name, in the political agency of Kattyawar, Bombay.

It is built on a creek on the S. W. coast of Gujerat, and maintains a considerable trade with Bombay and Malabar. Pop. 24,620.

Porbeagle (por'bē-gal), a fish of the Lamnidæ family of sharks. Three species have been described; the best known is *Lamna cornubica*, which occurs in the North Atlantic. It attains to a length of 10 feet, and feeds chiefly on fishes. The porbeagle has two dorsal fins, a wide mouth, lanceolate teeth, and very wide gill-openings.

Porcelain (pors'lān). See *China-ware* and *Pottery*.

Porcelain Crab (*Porcellāna*), a name for certain crustacea, typical of the family Porcellanidæ, small, smooth crabs, of which two are British: *P. platychēles*, the hairy, and *P. longicornis*, the minute, porcelain crab.

Porch (pōrch), an exterior appendage to a building, forming a covered approach to one of its principal doorways. The porches in some of the older churches are of two stories, having an upper apartment to which the name *parvis* is sometimes applied.— *The Porch* was a public portico in Athens (the *Stoa Poikile*), where the philosopher Zeno taught his disciples. Hence *The Porch* is equivalent to the *School of the Stoics*.

Porcia (pōr'she-a), an ancient Roman lady, a daughter of Cato of Utica. She first married M. Bibulus, Cæsar's colleague in the consulship (B.C. 59), by whom she had three children. Bibulus died in B.C. 48, and in B.C. 45 she married M. Brutus, who afterwards became the assassin of Cæsar. After the death of Brutus she put an end to her life.

Porcupine (por'kū-pīn), a name of a family of rodent quadrupeds, the best-known species of which belong to the genus *Hystrix*. The body is covered, especially on the back, with the so-called *quills*, or dense solid spine-like structures, intermixed with bristles and stiff hairs. There are two incisors and eight molar teeth in each jaw, which continue to grow throughout life from permanent pulps. The muzzle is generally short and pointed, the ears short and rounded. The anterior feet possess four, and the hinder feet five toes, all provided with strong, thick nails. The common or crested porcupine, *Hystrix cristāta*, found in Southern Europe and in Northern Africa, is the best-known species. When fully grown it measures nearly 2 feet in length, and some of its spines exceed 1 foot. Its general color is a grizzled, dusky black. The spines in their usual position lie nearly flat, with their points directed backwards; but when the animal is excited they are capable of being raised. The quills are loosely inserted in the skin, and may, on being violently shaken, become detached — a circumstance which may probably have given rise to the purely fabulous statement that the animal possessed the power of actually ejecting its quills like arrows or darts at an enemy. These animals burrow during the day, and at night search for food, which consists chiefly of vegetable matter. Of the American species, the Canadian or North American porcupine (*Erethizon dorsāta*) is the best known. It is about 2 feet long, and of slow and sluggish habits. The quills in this species are short, and are concealed among the fur. The ears are short, and hidden by the fur. The tail is comparatively short. The genus *Cercolabes* of South America possesses a distinctive feature in the elongated prehensile tail, adapting it for arboreal existence. These latter forms may thus be termed 'tree porcupines.' In length the typical species of this genus averages 1½ feet, the tail measuring about 10 inches.

Porcupine (*Hystrix cristāta*).

Porcupine Ant-eater. See *Echidna*.

Porcupine Crab (*Lithōdes hystrix*), a species of crab covered with spines, found off the coasts of Japan. It is dull and sluggish in its movements.

Porcupine Fish (*Diodon hystrix*), a fish of the order Plectognathi, found in the tropical seas. It is about 14 inches long, and is covered with spines or prickles.

Porcupine Grass (*Triodia* or *Festūca irritans*), a brittle Australian grass which it is proposed to utilize in the manufacture of paper.

Porcupine Wood, a name for the wood of the cocoanut palm.

Pordenone (pōr-dā-nō′nā), a town of North Italy, province of Udine, 40 miles N. N. E. of Venice. It is a well-built, stirring place, with manufactures of linen, copper utensils, paper and glass, and a considerable trade. Pop. 8425.

Pordenone, Il (so-called from his birthplace, Pordenone, his true name being Giovanni Antonio Licinio), or Regillo da Pordenone, a painter of the Venetian school, born about 1484. He executed many works for his native place; some also for Mantua, Vicenza, and Genoa; but his greatest works were for Venice. He died at Ferrara in 1540. Specimens of his works are to be found in many of the principal galleries of Europe.

Porgie (por′ji; *Pagrus argyrops*), a fish of the family Sparidæ, with an oblong body, scaly cheeks, and one dorsal fin, found off the coasts of the United States. It is one of the most important food fishes, and attains a length of 18 inches and a weight of 4 lbs. The name is also given to the Menhaden, which see.

Porifera (pō-rif′e-ra; 'pore-bearing'), a term occasionally employed to designate the sponges.

Porism (pō′rizm), a name given by ancient geometers to a class of mathematical propositions having for their object to show what conditions will render certain problems indeterminate. Playfair defined a porism thus: 'A proposition affirming the possibility of finding such conditions as will render a certain problem indeterminate, or capable of innumerable solutions.'

Pork, the flesh of swine, is one of the most important and widely-used species of animal food. Pork is coarser and ranker than beef or mutton, but when of good quality and well cured it develops a richness and delicacy of flavor in marked contrast with the dryness and insipidity of other salted meat. The abundance and digestive quality of its fat render it a suitable diet for cold climates. The swine was forbidden to be eaten by the Mosaic law, and is regarded by the Jews as especially typical of the unclean animals. Other Eastern nations had similar opinions as to the use of pork. Pork contains less fibrin, albuminous and gelatinous matter than beef or mutton. It is largely produced in the United States and exported in great quantities to Europe.

Porosity (pō-ros′i-ti), the name given to a property possessed by all bodies, in consequence of which their molecules are not immediately contiguous to one another, but are separated by intervening spaces or pores.

Porphyrio (por-fir′yo), a genus of birds of the rail family, including the *P. hyacinthinus* (purple or hyacinthine gallinule), a bird found in Europe, Asia and Africa, and remarkable for the structure of its beak and the length of its legs. It feeds on seeds and

Porphyrio hyacinthinus (Purple Gallinule).

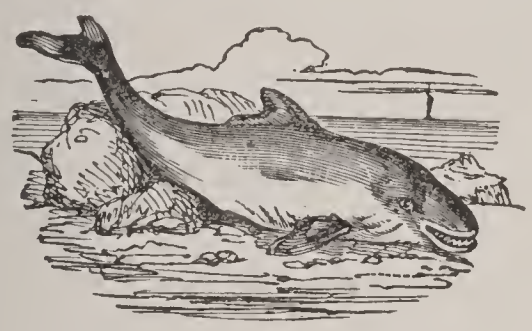
other hard substances, and lives in the neighborhood of water, its long toes enabling it to run over the aquatic plants with great facility. It is about 18 inches long, of a beautiful blue color, the bill and feet red.

Porphyry (por′fi-ri), originally the name given to a very hard stone, partaking of the nature of granite, susceptible of a fine polish, and consequently much used for sculpture. In the fine arts it is known as *Rosso Antiquo*, and by geologists as *Red Syenitic Porphyry*. It consists of a homogeneous felspathic base or matrix, having crystals of rose-colored felspar, called oligoclase, with some plates of blackish hornblende, and grains of oxidized iron ore embedded, giving to the mass a speckled complexion. It is of a red or rather of a purple and white color, more or less variegated, the shades being of all gradations from violet to a claret color. Egypt and the East furnish this material in abundance. It also abounds in Minorca, where it is of a red-lead color, variegated with black, white, and green. Pale and red porphyry, variegated with black, white, and green, is found in separate nodules in Germany, England, and Ireland. The art of cutting porphyry as practiced by the ancients appears to be now quite lost. In geology the term porphyry is applied to any unstratified or igneous rock in which detached crystals of felspar or some other mineral are diffused through a base of other mineral composition. Porphyry is known as felspar porphyry, claystone porphyry, porphyritic granite, and porphy-

ritic greenstone. In America it is often associated with gold.

Porphyry (Porphyrios), a Greek philosopher of the Neo-Platonic school, celebrated as an antagonist of Christianity, born about 233 A.D. He studied under Longinus at Athens, and at the age of thirty placed himself under the teaching of Plotinus at Rome. About 268 he went to Sicily, where he is said to have written his treatise against the Christians, which was publicly burned by the Emperor Theodosius, and is only known from fragments in the authors who have refuted him. Porphyry recognized Christ as an eminent philosopher, but he charged the Christians with corrupting his doctrines. He was a voluminous writer, but few of his works are extant. The most important are his lives of Plotinus and Pythagoras. Porphyry died about 304 or 306.

Porpoise (por'pus), a genus of cetacean mammalia, belonging to the family Delphinidæ (dolphins, etc.). The common porpoise (*Phocœna communis*) is the smallest and most familiar of all Cetacea, and occurs plentifully in the Atlantic. It attains an average length of 5 feet. The front of the head is convex in form, and has the spiracle or blowhole in the middle line. The eyes and ears are small. The caudal fin is horizontal and flattened. The neck is



Porpoise (*Phocœna communis*).

very short. The forelimbs project from the body. No hind limbs are developed. The teeth are small with blunted crowns. The stomach is in three portions. No olfactory nerves exist. The porpoise feeds almost entirely on herrings and other fish, and herds or 'schools' of porpoises follow the herring-shoals, among which they prove very destructive. An allied species is the round-headed porpoise, or 'caaing whale' of the Shetlanders. These latter measure from 20 to 24 feet in length, and are hunted for the sake of the oil. See *Caaing Whale*.

Porpora (por'po-ra), Nicolò, an Italian composer, was born at Naples about 1685, and was the favorite pupil of Scarlatti. His first opera, *Ariana e Teseo*, was brought out at Vienna, in 1717. By 1722 he had composed five operas and an oratorio. In 1725 he went to Vienna, and subsequently paid professional visits to Rome, Venice, and Dresden. In 1729 a party in London, which was discontented with Händel, opened a second opera house, and called Porpora to take the direction of it. Porpora was successful, and Händel after a heavy pecuniary loss gave up the theater, and devoted himself to oratorio. Porpora afterwards returned to the continent, and died in great poverty at Naples in 1767.

Porsenna (por-sen'a), or Por'sena, Lars, the king of the Etrurian city Clusium, according to the legend narrated by Livy, who received the Tarquins when they were expelled from Rome, and after in vain endeavoring to effect their restoration by negotiation, advanced with an army to Rome. The legendary story is that he was checked by Horatius Cocles, who defended the bridge over the Tiber leading to Rome. Modern critics have held that Rome was completely conquered by him.

Porson (por'son), Richard, critic and classical scholar, professor of Greek in the University of Cambridge, was born in 1759, at East Ruston, in Norfolk, where his father was parish clerk; and died at London in 1808. In 1777 he entered Trinity College, Cambridge, where he highly distinguished himself in classics, and in 1782 took the degree of B.A. and was chosen to a fellowship. This he resigned in 1792, since it could no longer be held by a layman, and Porson declined to take holy orders. Soon after he was unanimously elected Greek professor, a post which, however, brought him an income of only $200 a year. He edited and annotated several Greek works, especially four of the dramas of Euripides, and enjoyed the reputation of being one of the best Greek scholars and critics of the age, notwithstanding which he experienced little patronage, a circumstance partly attributable to his intemperate habits. In 1805 he was appointed librarian to the London Institution. He was familiar with English literature, and wrote for some of the chief periodicals of the day.

Port, a kind of wine. See *Port Wine*.

Port, a harbor or haven, or place where ships receive and discharge cargo. A *free port* is one at which the goods imported are exempted from the payment of any customs or duties, as long as they are not conveyed into the interior of the country.

Port, the name given to the left side of a ship (looking towards the prow), as distinguished from the starboard or right side. Formerly *larboard* was used instead of *port*.

Port Adelaide (pōrt ad′ē-lād), a seaport of South Australia, the port of the city of Adelaide, with which it is connected by a railway of 7½ miles. It is on the estuary of the Torrens, which enters the Gulf of St. Vincent, and is the chief port of S. Australia. The harbor accommodation has been recently greatly improved, extensive wharves, piers, etc., have been provided, but the entrance is still partly obstructed by bars. Pop. 20,089.

Portadown (pōrt-a-doun′), a market town, Ireland, in the county and 9 miles northeast of Armagh, on the Bann, which is navigable to vessels of 90 tons. Pop. 10,092.

Portage (port′aj), a city, capital of Columbia Co., Wisconsin, on the Wisconsin River, at head of navigation, 30 miles N. of Madison. It is on the ship canal that connects the Wisconsin and Fox Rivers, and has hosiery and knitting mills, plow factory, etc., and considerable trade. Pop. 5440.

Portage, a term applied in the United States and Canada to a break in a chain of water communication, over which goods, boats, etc., have to be carried, as from one lake, river, or canal to another; or, along the banks of rivers, round waterfalls, rapids, etc.

Portage la Prairie, a town of Manitoba, Canada, 56 m. w. of Winnipeg. It has railroad shops, grain elevators. Pop. 5892.

Portal Circulation, a subordinate part of the venous circulation, belonging to the liver, in which the blood makes an additional circuit before it joins the rest of the venous blood. The term is also applied to an analogous system of vessels in the kidney.

Port Arthur, a seaport of Manchuria, at the s. w. extremity of Liao Tung peninsula, with a splendid, nearly landlocked harbor, ice-free for nearly the whole year. It is of special interest for its history. Fortified and made the chief naval station of China in 1891, it was taken in 1894 by the Japanese, who destroyed its fortifications. Japan was obliged to restore it to China, and in 1898 it was leased to Russia, which country fortified it and made it a great naval station, and the chief terminus of the Transsiberian Railway. Though apparently well-nigh impregnable, it was taken by the Japanese in 1905 as a result of war with Russia, and is held by them conformably to the treaty of Portsmouth.

Port Arthur, a city and seaport of Jefferson Co., Texas, on Sabine Lake, near the head of the canal to Sabine Pass, which opens into the Gulf of Mexico. It is an oil center and shipping point. Pop. 7663.

Port Arthur, a town and harbor at the northwestern extremity of Lake Superior, Ontario, Canada, and a station on the Canadian Pacific Railway. It has extensive mining and lumbering interests and a large shipping trade. Pop. (1911) 11,220.

Port-au-Prince (por-tō-prans), capital of the Republic of Hayti, on the western side of the island, at the southeast extremity of the bay of the same name. It is built in a low and unhealthy spot, consists chiefly of wooden houses, and contains an ungainly palace, a senate-house, a Roman Catholic church, a custom-house, mint, a hospital, lyceum, etc. The chief exports are mahogany and red-wood, coffee, and cocoanuts. Pop. about 60,000.

Port Chester, a summer resort of Westchester Co., New York, on Long Island Sound, 26 miles N. E. of New York city. It has large planing mills, laundries, shirt and sheet factories, and stove and iron bolt works. Pop. 12,809.

Portcullis (pōrt-kul′is), a strong grating of timber or iron, resembling a harrow, made to slide in vertical grooves in the jambs of the entrance-gate of a fortified place, to protect the gate in case of assault.

Port Darwin (där′win), an inlet on the northern coast of Australia, the chief harbor of the Northern Territory of South Australia, about 2000 miles from Adelaide. The port town is Palmerston.

Port Durnford (durn′ford), a good harbor on the east coast of Equatorial Africa, in lat. 1° 13′ S., at the mouth of the Wabuski River.

Porte (pōrt), Ottoman, or Sublime Porte, the common term for the Turkish government. The chief office of the Ottoman Empire is styled *Babi Ali*, lit. the High Gate, from the gate (*bab*) of the palace at which justice was administered; and the French translation of the term being *Sublime Porte*, this has come into common use.

Port Elizabeth, a seaport in the east of Cape Colony, on Algoa Bay. It contains many fine buildings, including a town-house, custom-house, hospitals, etc., and is the

great emporium of trade for the eastern portion of the colony as well as for a great part of the interior, being the terminus of railways that connect it with Kimberley and other important inland towns. It is now a greater center of trade than Cape Town. Pop. 32,959.

Porter (pōrt'er), ANNA MARIA, was born about 1781. She produced a number of novels, which enjoyed considerable popularity in their day. Died in 1832.

Porter, DAVID, naval officer, was born at Boston, Massachusetts, in 1780. Entering the navy, he was put in command of the frigate *Essex* in 1813, and captured the British war vessel *Alert* and a number of merchantmen. In 1813 he cruised in the Pacific and took a large number of prizes. In March, 1814, the *Essex* was attacked at Valparaiso by two British war vessels and was captured after a long and desperate resistance. He was naval commissioner 1815-23, chargé d'affaires at Constantinople in 1831, and minister in 1839. He died in 1843.

Porter, DAVID DIXON, naval officer, son of the preceding, was born in Chester, Pennsylvania, in 1813. He entered the United States navy as midshipman in 1829. He served during the Mexican war, and was in every action on the coast. At the beginning of the Civil war he was placed in command of the steam-frigate *Powhatan.* In command of a mortar fleet he took an active part in the reduction of Forts Jackson and St. Philip on the Mississippi; also aided in the capture of Vicksburg and Arkansas Post. For these services he was made rear-admiral. In 1865 he aided General Terry in the capture of Fort Fisher. In 1866 he was promoted vice-admiral, and in 1870 appointed admiral, the highest rank in the navy. He died in 1891.— His brother, WILLIAM D. (1809-64), also served in the navy in the Civil war, destroyed the iron-clad ram *Arkansas* in 1862, and was promoted commodore.

Porter, FITZ-JOHN, soldier, was born in New Hampshire, and was graduated from West Point in 1845. He became a captain in 1856 and a colonel in 1861. For his courage at the battles of Gaines's Mill and Malvern Hill in 1862 he was appointed major-general of volunteers. Though present with his corps at the second battle of Bull Run, he took no part in the contest, and was accused of delinquency by General Pope, tried by court-martial, and dismissed from the service. The charges against him were re-examined under President Hayes and he was found not guilty and was reinstated as colonel in 1886. He was police commissioner of New York in 1884-88, and held other positions there, dying in 1901.

Porter, JANE, an English novelist, was born at Durham in 1776; died in 1850. Her *Thaddeus of Warsaw* and *Scottish Chiefs* were long popular.

Porter, NOAH, philosopher and writer, born at Farmington, Connecticut, in 1811. Graduating at Yale College in 1831, he was ordained pastor of the Congregational Church, New Milford, Conn., in 1836, and in 1843 settled at Springfield, Mass. Returning to Yale in 1846 as professor of metaphysics and moral philosophy, he was elected president in 1871, and continued to hold that position till 1886. Among his works are *Historical Discourses, The Human Intellect, Books and Reading, The Science of Nature versus the Science of Man, The Elements of Intellectual Philosophy, The Elements of Moral Science,* etc. He also edited an edition of *Webster's Dictionary.* He died in 1892.

Porter, SIR ROBERT KER, artist and traveler, born at Durham about 1775; died at St. Petersburg in 1842. He was brother to Jane and Anna Maria Porter, became a student at the Royal Academy, painted several large battle-pieces, and in 1804 was invited to Russia by the emperor, who made him his historical painter. In 1808 he joined the British forces under Sir John Moore, whom he accompanied to Spain. Subsequently he returned to Russia and married the Princess Sherbatoff. In 1813 he obtained the honor of knighthood. From 1817 to 1820 inclusive he was engaged in traveling through the East, and from 1826 to 1841 was British consul to Venezuela. Among his works are *Traveling Sketches in Russia and Sweden; Letters from Portugal and Spain; Narrative of the Campaign in Russia; Travels in Georgia, Persia, and Armenia.*

Port-Glasgow (glas'kō), a seaport of Scotland, in Renfrewshire, on the southern bank of the estuary of the Clyde above Greenock. When the Clyde was deepened so as to enable large vessels to sail up to Glasgow, the trade of Port-Glasgow rapidly diminished. Recently, however, it has somewhat revived. The staple industries are shipbuilding and marine engineering; and there are manufactures of sailcloth, ropes, etc. Pop. 16,840.

Port Hope, a town of Canada, on the northern shore of Lake Ontario, 63 miles N. E. of Toronto by the Grand Trunk Railway. The town

is beautifully situated at the base and on the declivity of the hills overlooking the lake. It has active industries, and a good trade in timber, grain and flour. Pop. (1911) 5089.

Port Huron (hū'run), a city of Michigan, capital of St. Clair Co., on the St. Clair River, at the southern extremity of Lake Huron and opposite Sarnia, Canada, with which it is connected by a tunnel under the river. It is a railroad terminus, and has daily steamship connections with Detroit, 62 miles distant. It is an important grain and wool market, and has extensive pipeworks, agricultural implements and other factories, shipyards, dry docks, large elevators, etc. Under the city is a deposit of salt, also oil and natural gas. Pop. 18,863.

Portici (por'ti-chē), a town in Southern Italy, on the Gulf of Naples, at the base of Vesuvius. It is about 5 miles east from the city of Naples, but is connected with it by the long village of S. Giovanni a Teduccio. (See plan at *Naples.*) It is delightfully situated, has many elegant villas, and is surrounded by fine country seats. It possesses a royal palace, now the property of the municipality of Naples. An active fishery is carried on. Pop. 14,239.

Portico (por'ti-kō), in architecture, a kind of porch before the entrance of a building fronted with columns, and either projecting in front of the building or receding within it. Porticoes are styled tetrastyle, hexastyle, octostyle, decastyle, according as the columns number four, six, eight, or ten.

Port Jackson (jak's'n), a beautiful and extensive inlet on the east coast of Australia in New South Wales, forming a well-sheltered harbor on the south shore of which Sydney stands. See *Sydney.*

Port Jervis (jėr'vis), a town and summer resort of Orange Co., New York, on the Delaware River, above the mouth of the Neversink, 88 miles N. W. of New York. It is surrounded by attractive scenery, and has extensive railroad shops, iron foundries, glassworks, glove and shoe factories, silk-mills, etc. Pop. 9564.

Portland (pōrt'land), a seaport of Maine, capital of Cumberland Co., on a peninsula at the western extremity of Casco Bay, 108 miles N. by E. of Boston. It is a picturesque and well-built city, with handsome public buildings, and abundance of trees in many of its streets. This has given it the name of 'Forest City.' The trade, both maritime and inland, is extensive, Portland being the terminus of important railways. The harbor is easy of access, capacious, safe, deep enough for the largest vessels, and rarely obstructed with ice. Shipbuilding is largely carried on, and it has a valuable foreign trade, especially with Britain and the West Indies, and a large coastwise trade. It is also extensively engaged in the cod and mackerel fisheries. Its industries include extensive canning and packing works, oil refining, engine and stove works, car and locomotive shops, heavy iron forgings, and other manufactures. The poet Longfellow was born here. Portland is an old town, the site being first settled in 1632. Pop. 58,571.

Portland, a city, capital of Jay Co., Indiana, on the Salamonie River, 30 miles N. E. of Muncie. It has lumber and flour mills and wood-working industries. There are oil wells in its vicinity. Pop. 5130.

Portland, the chief city of Oregon, and capital of Multnomah Co., situated on the left bank of Willamette River, about 12 miles from its confluence with the Columbia and at the head of navigation. It is an important commercial center and shipping point, having regular steamship connection with San Francisco and other coast towns, also with China and Japan. It is extensively engaged in slaughtering and packing, in ship and boat building, and has numerous manufactures. Its exports include wheat, fruit, flour, wool, lumber, salmon, etc. The city is attractively built, and was the seat of the Lewis and Clark exhibition of 1905. Pop. 207,214.

Portland, Isle of, a peninsula, supposed to have been formerly an island in the county of Dorset, 50 miles W. S. W. of Southampton, in the British Channel. It is attached to the mainland by a long ridge of shingle, called the Chesil Bank, and it consists chiefly of the well-known Portland stone (which see), which is chiefly worked by convicts, and is exported in large quantities. One of the most prominent objects in the island is the convict prison, situated on the top of a hill. It contains about 1500 convicts. The south extremity of the island is called the *Bill of Portland,* and between it and a bank called the Shambles is a dangerous current called the *Race of Portland.* See also *Portland Breakwater.*

Portland Beds, in geology, a division of the Upper Oölites occurring between the Purbeck Beds and the Kimmeridge Clay, consisting of beds of hard oölitic limestone and freestone interstratified with clays and

resting on light-colored sands which contain fossils, chiefly mollusca and fish, with a few reptiles. They are named from the rocks of the group forming the isle of *Portland* in Dorsetshire, from whence they may be traced through Wiltshire as far as Oxfordshire.

Portland Breakwater, the greatest work of the kind in Britain, runs from the northeast shoulder of the Isle of Portland (which see) in a northeasterly direction, with a bend towards the English Channel, and forms a complete protection to a large expanse of water between it and Weymouth, thus forming an important harbor of refuge. It consists of a sea-wall 100 feet high from the bottom of the sea, 300 feet thick at the base, and narrowing to the summit, and consists of two portions, one connected with the shore, 1900 feet in length, and another of 6200 feet in length, separated from the former by an opening 400 feet wide, through which ships can pass straight to sea with a northerly wind. It is protected by two circular forts, the principal at the north end of the longer portion. The work, which was carried out by government, occupied a period of nearly twenty-five years, ending with 1872. It is constructed of Portland stone.

Portland Cement, a well-known and largely used cement, which derives its name from its near resemblance in color to Portland stone. It is made from chalk and clay or mud in definite proportions. These materials are intimately mixed with water, and formed into a sludge. This is dried, and when caked is roasted in a kiln till it becomes hard. It is afterwards ground to a fine powder, in which state it is ready for market. This cement is much employed along with gravel or shivers for making artificial stone. A month after it is set it forms a substance so hard as to emit a sound when struck.

Portland Stone, is an oölitic limestone occurring in great abundance in the Isle of Portland, England. (See *Portland.*)

Portland Vase (or BARBERINI), a celebrated ancient cinerary urn or vase, of the third century after Christ, found in the tomb of the Emperor Alexander Severus. It is of transparent, dark-blue glass, coated with opaque, white glass, which has been cut down in the manner of a cameo, so as to give on each side groups of figures delicately executed in relief, representing the marriage of Peleus and Thetis. In 1810 the Duke of Portland, its owner, allowed it to be placed in the British Museum, where it remained intact till the year 1845, when it was maliciously broken. The pieces were carefully collected and very successfully reunited.

Port Louis (lō'is), the capital of the island of Mauritius, on the northwest coast, beautifully situated in a cove formed by a series of basaltic hills, partially wooded, varying in height from 1058 to 2639 feet. The site is rather unhealthy. The streets, though rather narrow, are laid out at right angles and adorned with acacias. A mountain stream traverses the town, and an open space like a racecourse lies behind it. There are barracks, theater, public library, botanic garden, hospital, etc., but no buildings of architectural importance. The town and harbor are protected by batteries. Pop. 53,978.

Port Lyttelton. See *Lyttelton.*

Port Mahon (mȧ-ōn'), the capital of the island of Minorca, situated on a narrow inlet in the S. E. of the island. The harbor, protected by three forts, is one of the finest in the Mediterranean, and is capable of accommodating a large fleet of ships of the heaviest tonnage. Pop. 17,975.

Port Natal. See *Durban.*

Porto. Same as *Oporto.*

Porto Alegre (ȧ-lā'gre), a town in Brazil, capital of the province of Rio Grande do Sul, near the northwest extremity of Lake Patos, 150 miles N. N. W. of Rio Grande. It is well and regularly built. The harbor is much visited by merchant vessels, and it has an important trade. Pop. about 100,000.

Portobello (pōr′tō-bel′lō), a parliamentary burgh (Leith district) of Scotland, 3 miles east of the city of Edinburgh on the Firth of Forth, much frequented as a summer resort. Pop. 9200.

Porto Bello, a seaport of Panamá, on the Caribbean Sea, 40 miles N. N. W. of Panama. Formerly of some importance, it is now a poor and miserable place, although its fine harbor still attracts some trade.

Porto Cabello (ca-bel′lō), a town of Venezuela, on the Caribbean Sea. It has a capacious and safe harbor. Pop., with district surrounding, about 14,000.

Porto Ferrajo (fer-rä′yō), chief town of the island of Elba, on the north coast. Pop. 4222. Napoleon I resided here from May 5, 1814, to February 26, 1815.

Port of Spain, the chief town of the island of Trinidad. It is a pleasant, well-built town; has two cathedrals, government house, town-hall, courthouse, theater, barracks, etc. It is a railway terminus, and has an active trade. It is a port of call for many lines of ocean steamers. Pop. 54,500.

Port Orchard (changed from name of Sidney in 1894), capital of Kitsap Co., Washington. It is situated on Port Orchard Bay, an inlet of Puget Sound, 18 miles W. of Seattle. It is a naval station of the United States, with a very large dry dock, 600 feet long by 75 wide, and capable of holding vessels with a draught of 30 feet. Pop. 682.

Porto Rico (pōr′to rē′ko; Sp., *Puerto Rico*), formerly one of the Spanish West Indian Islands, the fourth in size of the Antilles, east of Hayti; area, with subordinate isles, 3596 square miles. The island is beautiful and very fertile. A range of mountains, covered with wood, traverses it from east to west, averaging about 1500 feet in height, but with one peak 3678 feet high. In the interior are extensive savannahs; and along the coast tracts of fertile land, from 5 to 10 miles wide. The streams are numerous, and some of the rivers can be ascended by ships to the foot of the mountains. There are numerous bays and creeks. The chief harbor is that of the capital, San Juan de Porto Rico; others are Mayaguez, Ponce, and Arecibo. The climate is rather healthy except during the rainy season (Sept.–March). Gold is found in the mountain streams. Copper, iron, lead, and coal have also been found; and there are saline or salt ponds. The chief products are sugar, rum, molasses, coffee, cotton, tobacco, hides, live stock, dyewoods, timber, rice, etc. There are extensive phosphate deposits along the south coast. The island was discovered by Columbus in 1493, and was settled by the Spaniards in 1510, who soon exterminated the natives. Invaded by the United States, July, 1898, it was ceded by Spain to that government by the treaty of peace. Since its occupation by the United States a good school system has been introduced, attendance being made compulsory, and various steps have been taken for the advancement of the people, including the establishment of a legislative assembly and trade advantages which have led to a large commerce with this country. Pop. 1,118,012.

Porto Rico, San Juan de, the capital and principal seaport of the above island, on its north coast, stands upon a small island connected with the mainland by a bridge, is surrounded by strong fortifications, and is the seat of the government. Pop. 48,716.

Port Phillip, Australia. See *Melbourne.*

Port Royal (roi′al), a fortified town on the southeast coast of Jamaica, on a tongue of land, forming the south side of the harbor of Kingston. Its harbor is a station for British ships of war, and it contains the naval arsenal, hospital, etc. It has been often damaged by earthquakes. Pop. 14,000.

Port Royal, a Cistercian convent in France, which played an important part in the Jansenist controversy. It was situated near Chevreuse (department of Seine-et-Oise), about 15 miles S. W. of Paris, and was founded in 1204 by Matthieu de Montmorency, under the rule of St. Bernard. Port Royal, like many other religious houses, had fallen into degenerate habits, when in 1609 the abbess Jacqueline Marie Angélique Arnauld undertook its reform. The number of nuns increased considerably under her rule, and in 1625 they amounted to eighty. The building thus became too small, and the insalubrity of the situation induced them to seek another site. The mother of the abbess purchased the house of Cluny, in the Faubourg Saint Jacques, Paris, to which a body of the nuns removed. The two sections of the convent were now distinguished as Port Royal des Champs and Port Royal de Paris. About 1636 a group of eminent literary men of decided religious tendencies took up their residence at Les Granges, near Port Royal des Champs, where they devoted themselves to religious exercises, the education of youth, etc. These were re-

PORTO RICO

Scale of Miles

0 5 10 15 20

Railroads

Railroads Projected

Improved Roads

Capital

Size of type indicates relative importance of places

ATLANTIC OCEAN

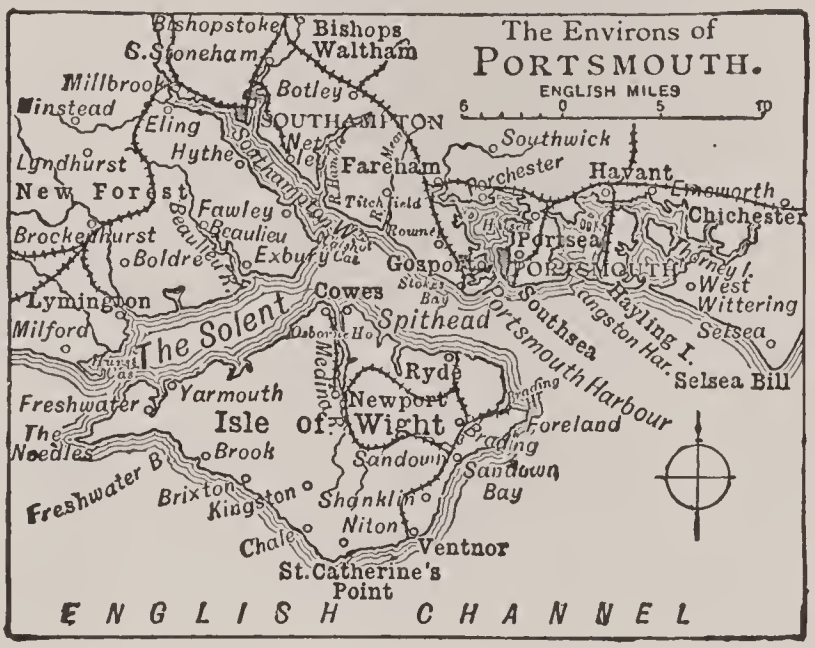
CARIBBEAN SEA

67° 15′ 67° 66° 45′ Long. West 66° 30′ from Greenw. 66° 15′ 66° 65° 45′

18° 30′ 18° 15′ 18° 17° 45′ 17° 30′ 17°

Pt. Agujereada, Pt. Borinquen, Aguadilla B., Pt. Aguada, Pt. Jigüero, C. San Francisco, Ensenada Pt., Cadena Pt., Algarrobo Pt., Mayaguez Bay, Pt. Guanajibo, Estero R., L. Joyuda, Pt. Ostiones, Fanduca Cay, Port Real, Pt. Boca Prieta, Pt. Guanaquilla, Boqueron Bay, Pt. Melones, Pt. Aguila, Salinas B., C. Rojo, Pt. Molino, Sucia B., Pt. Jacinto, Pt. Sardina, Isabela, Pt. Penon, Caimito, Hatillo, Pt. Las Tunas, Pt. Palmas Altas, Pt. Manatí, Pt. Puerto Nuevo, Pt. Chivato, Ceno Gordo Pt., Pt. Boca Juana, Pt. Fraile, Pt. Salinas, Boca Toa, Palo Seco Pt., Santurce, Pt. Maldonado, Pt. Congrejos, Pt. María, Pt. Vacia Talegas, Pt. Iglesia, Pt. Uvero, Pt. San Augustin, Pt. Miquillo, Comezon Cove, Embarcaderos Pt., Luquillo, Pt. San Diego, C. Grande, Nicacos I., Palominos I., Pineros I., Pt. Mata Redonda, Pt. Figuera, Port Medio Mundo, Pt. Medio Mundo, Pt. Puerca, Ensenada Honda, Pt. Cascajo, Algodones B., Pt. Lima, Port Naguabo, Punta Santiago, Santiago Cay, El Morrillo, Morro de Humacao, Pt. Candelero, Pt. Guayanes, Yabucoa Harbor, Pt. Tuna, Port Maunabo, C. Mala Pascua, Vegueas Pt., Pt. Viento, Pt. Figueras, Arroyo, Pt. Barrancas, Reef Pt., Las Marcas Reef, Caribes Is., Barca Is., Pajaro I., Rayones I., Pt. Arenas, Mata I., Rincon Bay, Pt. Petrona, Jauca Is., Cavilo Pt. Landing, Berseria I., Jacaguas Ldg., Muertos I., Pt. Cabullon, Pt. Yaquero, Pt. Ferraco, Guayanilla Harbor, Creole Pt., Guanica Harbor, Pt. Breá, Montalva, Pt. Jorobado, Pt. Montalva, Mateo I., Pt. Toco, Cueva I., Guanica Landing, Parguera, L. Guanica, Sucia B., Pt. Aguila, Salinas B., C. Rojo, Pt. Molino, Aguadilla, Aguadilla B., Aguada, Moca, Caimito, Rincon, Agueda, San Sebastian, Barrio Pileta, Altosano, Anasco A. & A., Lares, Quebradillas, Arecibo, Pt. Cararoles, Cano del Tiburones, Cambalache, Barceloneta, Florida, Isolina, Ciales, Manati, L. del Tortuguero, Vega Baja, Dorado, Toa Baja, Catano, Bayamon, Vega Alta, Toa Alta, Morovis, Corozal, Naranjito, Barrio Nuevo, Martin Peña, Rio Piedras, La Muda, Trujillo Alto, Carolina, Canovanas, Loiza, Rio Grande, Mameyes, Fajardo, Ceiba, Gurabo, Juncos, San Lorenzo, Naguabo, Naguabo Plaza, Las Piedras, Humacao, Patillas, Maunabo, Yabucoa, Guayama, Salinas, Central Aguirre, Santa Isabel, Coamo, Juana Diaz, Barrio Tibes, Ponce, Penuelas, Guayanilla, Yauco, Sabana Grande, Mata de Platano, Guaynabo, Fraternidad, Santa Rita, Lajas, Cabo Rojo, San German, Hormigueros, Mayaguez, Las Marias, Consumo, Los Vegas, Maricao, Adjuntas, Jayuya, Utuado, Grande de Arecibo, Tanama R., Caonillas R., Barros, Barranquitas, Comerio, Aguas Buenas, Caguas, Cidra, Las Cruces, Aibonito, Aldea Villalba, Cayey, Orocovis, Morovis, Ciales, Isolina, Florida, Barceloneta, Manati, Vega Alta, Vega Baja, Dorado, Toa Baja, Catano, Bayamon

garded as forming a joint community with the nuns of Port Royal, among whom most of them had relatives. Among the number were Antoine Arnauld, Arnauld d'Andilly, Lemaistre de Sacy and his two brothers, all relatives of the abbess; Nicole, and subsequently Pascal, whose sister Jacqueline was at Port Royal. The educational institution, thus founded, which flourished till 1660, became a powerful rival to the institution of the Jesuits, and as the founders adopted the views of Jansenius (see *Jansenists*), subsequently condemned by the pope, a formidable quarrel ensued, in which the Port-Royalist nuns, siding with their male friends, became subject to the relentless opposition of the Jesuits, which culminated in the complete subversion of their institution. Port Royal des Champs was finally suppressed by a bull of Pope Clement II (1709), and its property given to Port Royal de Paris. The latter continued its existence to the Revolution, when its house was converted into a prison, and subsequently (1814) into a maternity hospital.



Portrush (pōrt-rush′), a small seaport in the north of Ireland, 5 miles north of Coleraine; much resorted to for sea-bathing. It is connected with the Giant's Causeway by an electric tramway. Pop. 1196.

Port Said (pōrt-sä-ēd′), a town in Egypt, on the Mediterranean, at the northern entrance of the Suez Canal. It was begun simultaneously with the canal in 1859, being designed for its terminal port. There is an outer harbor formed by two piers jutting out into the sea, each terminated by a small lighthouse. This admits large ocean steamers, which thus sail into the inner harbor and from it into the canal. Near the entrance to the inner harbor is a lofty lighthouse with a powerful light. Pop. (1907) 49,884.

Portsea (pōrt′sē), an island of Hampshire, England, about 5 miles long (N. to S.) by about 3 broad. It comprises the towns of Portsmouth and Portsea, and several villages, and is connected with the mainland by a bridge at its north end. See *Portsmouth*.

Portsmouth (pōrts′muth), the principal station of the British navy, a seaport of England, in Hampshire, on the southwest extremity of the island of Portsea. It consists of the four districts, Portsmouth proper, Portsea, Landport, and Southsea. Portsmouth proper is a garrison town. The best street is the High Street, which contains the principal shops, hotels, and places of business. Portsea is the seat of the naval dockyard; Landport is an artisan quarter; and Southsea on the east side of the town of Portsmouth is a favorite seaside resort, and commands fine views of Spithead and the Isle of Wight. Southsea Castle with its adjacent earthworks, the batteries of the Gosport side, and the circular forts built out in the roadstead, command the entrance to Portsmouth Harbor. The island of Portsea, which is separated from the mainland by Portsbridge Canal, is bounded on the east by Langston Harbor, on the west by Portsmouth Harbor, and on the south by Spithead and the Harbor Channel. The royal dockyard covers an area of about 500 acres, and is considered the largest and most magnificent establishment of the kind in the world. Enclosed by a wall 14 feet high, and entered by a lofty gateway, it includes vast storehouses, containing all the materials requisite for naval archiecture; machine shops, with all modern appliances; extensive slips and docks, in which the largest ships of the navy are built or repaired; ranges of handsome residences for the officials, and a Royal Naval College, with accommodation for seventy students. Outside the dockyard an area of 14 acres contains the gun-wharf, where vast numbers of guns and other ordnance stores are kept, and an armory with 25,000 stand of small arms. Portsmouth has no manufactures of any consequence, except those immediately connected with its naval es-

tablishments, and a few large breweries. Its trade, both coasting and foreign, is of considerable extent. Of late years an extensive and systematic series of fortifications has been under construction for the complete defense of Portsmouth. They extend along a curve of about 1½ miles at the north side of Portsea Island. A series of hills, 4 miles to the north of Portsmouth, and commanding its front to the sea, are well fortified with strong forts. On the Gosport side a line of forts extends for 4 miles. The municipal and parliamentary borough includes nearly the whole of the island of Portsea. Pop. (1911) 231,165.

Portsmouth, a seaport of Rockingham County, New Hampshire, on the right bank of the Piscataqua, 3 miles above its mouth in the Atlantic, 58 miles north by east of Boston. It has long been noted for skill in naval architecture, and for maritime enterprise. It is the seat of a government navy yard, and the harbor is one of the safest and most commodious in the United States. The navy yard contains three immense ship houses and a large floating balance dock. The *North America*, the first ship-of-line launched in the Western Hemisphere, was built in this harbor, and the *Kearsarge*, of Civil war fame, was also built here. The manufactures are not extensive. Portsmouth was the scene of the peace conference between the representatives of Russia and Japan and the treaty of peace was signed here September 5, 1905. Pop. 11,269.

Portsmouth, a city, capital of Scioto County, Ohio, on the Ohio above the mouth of Scioto River, 95 miles S. of Columbus. It is an important manufacturing town, its industries including rolling mills, iron foundries and machine shops, steel, stove, furniture and veneer works, and paving brick yards. Building stone and fire-clay are found here. Pop. 23,481.

Portsmouth, a seaport of Virginia, on the Elizabeth River, opposite Norfolk. The wide river forms a good harbor, admitting vessels of the largest size. In its suburb of Gosport is a large United States navy yard, with a very large dry dock. Here some of the largest battleships have been built. The city has railroad shops and other manufactures and an important export trade in cotton, pig iron, lumber, naval stores and vegetables. There is here a large naval hospital and several academic schools. Pop. 33,190.

Port Stanley, port and capital of the Falkland Islands, on Port William Inlet, on the N. E. coast of East Falkland. It exports wool, hides, seal-fur, etc. Pop. 900.

Port Talbot. See *Aberavon.*

Portugal (pōr'tū-gal), a kingdom in the southwest of Europe, forming the west part of the Iberian Peninsula; bounded east and north by Spain, and west and south by the Atlantic; greatest length, north to south, 345 miles; greatest breadth, 140 miles. It is divided into seven provinces: Minho, Trazos-Montes, Beira, Estremadura, Alemtejo, and Algarve, with a total area of 34,462 sq. miles, and a population of 5,016,267. The Azores and Madeira Islands are regarded as integral parts of the kingdom, and have an area of 1236 sq. miles and a population of 406,865. The colonial possessions of Portugal consist of — in Asia — Goa, Salsette, Damaun, and Diu, all in Hindustan, Macao in China, and possessions in the Indian Archipelago, having together an area estimated at 7923 square miles, and a population estimated at 847,503; in Africa — Cape Verd, St. Thomas, and Prince's Islands, the Guinea settlements, Angola (Congo, Benguela, Mossamedes), Mozambique and dependencies, with an aggregate area of 697,335 square miles, and an estimated population of 4,141,448.

Physical Features.—Portugal is only partially separated from Spain by natural boundaries. Its shape is nearly that of a parallelogram. The coast-line, of great length in proportion to the extent of the whole surface, runs from the north in a general S. S. W. direction till it reaches Cape St. Vincent, where it suddenly turns east. It is occasionally bold, and rises to a great height; but far the greater part is low and marshy, and not infrequently lined by sands and reefs, which make the navigation dangerous. The only harbors of any importance, either from their excellence or the trade carried on at them, are those of Lisbon, Oporto, Setubal, Faro, Figueira, Aveiro, and Vianna. The interior is generally mountainous, a number of ranges stretching across the country, forming a succession of independent river basins, while their ramifications form the watersheds of numerous subsidiary streams, and enclose many beautiful valleys. The loftiest range is the Serra d'Estrella, a continuation of the central chain stretching across Spain, which attains the height of 7524 feet. The nucleus of the mountains is usually granite, especially in the north and middle. The minerals include lead, iron, copper, manganese, cobalt, bismuth, antimony, marble, slate, salt, saltpeter, lithographic stones, mill-

stones, and porcelain earth. No rivers of importance take their rise in Portugal. The Minho in the north, the Douro, and the Tagus all rise in Spain and flow from east to west. The Guadiana is the only large river which flows mainly south. Portugal can only claim as peculiarly her own the Vouga Mondego, and Sado.

Climate and Productions.— The climate is greatly modified by the proximity of the sea and the height of the mountains. In general the winter is short and mild, and in some places never completely interrupts the course of vegetation. Early in February vegetation is in full vigor; during the month of July the heat is often extreme, and the country assumes, particularly in its lower levels, a very parched appearance. The drought generally continues into September; then the rains begin, and a second spring unfolds. Winter begins at the end of November. In the mountainous districts the loftier summits obtain a covering of snow, which they retain for months; but south of the Douro, and at a moderate elevation, snow does not lie long. The mean annual temperature of Lisbon is about 56°. Few countries have a more varied flora than Portugal. The number of species has been estimated to exceed 4000, and of these more than 3000 are phanerogamous. Many of the mountains are clothed with forest trees, among which the common oak and the cork oak are conspicuous. In the central provinces chestnuts are prevalent; in the south both the date and the American aloe are found; while in the warmer districts the orange, lemon, and olive are cultivated with success. The mulberry affords food for the silkworm, and a good deal of excellent silk is produced. The vine, too, is cultivated, and large quantities of wine are sent to Britain (especially port wine), and also to France, being in the latter country converted into Bordeaux wine. Agriculture generally, however, is at a low ebb, and in ordinary years Portugal fails to raise cereals sufficient to meet its own consumption. Among domestic animals raised are mules of a superior breed, sheep, goats, and hogs; but up to a very few years ago little attention was paid to their improvement. In consequence of recent reforms, however, there has been a marked improvement in most branches of industry. More horned cattle have been raised and of a better quality, and live stock now figures with timber and wine among the chief exports. The fisheries, so long neglected, have also been revived in recent years.

Manufactures, Industry, etc.— Manufactures are of limited amount, although they have been increasing of late years. They embrace woolens, cottons, silks, earthenware and porcelain, soap, paper, iron goods, hats, etc. The principal exports are wine, cork, cattle, timber, olive-oil, fruits, iron and copper pyrites, and wool; the principal imports are cereals, salt provisions, colonial produce, woolen, cotton, linen, and silk tissues, iron, steel, and other metals, and coal. The trade is mostly with Great Britain, France, and Brazil. Cotton goods to the value of nearly $5,000,000 are annually exported from Great Britain to Portugal. Accounts are kept in *reis*, *milreis*, or 1000 reis, and *conto de reis* or 1,000,000 reis. The value of the rea (or *real*) is so minute that the milreis is worth only about 58 cents. The French metric system of weights and measures was introduced into Portugal between 1860 and 1863.

Government, etc.— The government, now a republic, was until 1910 a monarchy, the crown hereditary both in the male and female line. The constitution recognized four powers in the state — the legislative, executive, judicial, and moderating, the last vested in the sovereign. There were two chambers, the Chamber of Peers and the Chamber of Deputies. In 1885 a law was passed abolishing hereditary peerages by a gradual process. While the established religion is the Roman Catholic, other religions are tolerated. Conventual establishments were suppressed in 1834. Education, under a distinct ministry, was compulsory; but the law was not enforced, and the general state of education is low. The revenue has been almost constantly deficient for more than thirty years and the national debt is now $864,701,000. The army, consisting of 30,000 men on the peace footing, is raised both by conscription and enlistment. For war service about 150,000 more men could be put into the field. The navy comprises 5 cruisers and about 50 other craft.

History.— The Phœnicians, Carthaginians, and Greeks early traded to this part of the peninsula, the original inhabitants of which are spoken of as Lusitanians, the country being called Lusitania. It was afterwards conquered by the Romans, who introduced into it their own civilization. The country was afterwards inundated by Alans, Suevi, Goths, and Vandals, and in the eighth century (712) was conquered by the Saracens. When the Spaniards finally wrested the country between the Minho and the Douro from Moorish hands, they placed counts or governors over this region. Henry the Younger of Burgundy, grand-

son of Hugh Capet, came into Spain about 1090, to seek his fortune in the wars against the Moors. Alphonso VI gave him the hand of his daughter, and appointed him (1095) count and governor of the provinces Entre Douro e Minho, Traz-os-Montes, part of Beira, etc. The count, who owed feudal services to the Castilian kings, was permitted to hold in his own right whatever conquests he should make from the Moors beyond the Tagus (1112). Henry's son, Alphonso I, defeated Alphonso, king of Castile, in 1137, and made himself independent. In 1139 he gained the brilliant victory of Ourique over the Moors, and was saluted on the field as King of Portugal. The cortes convened by Alphonso in 1143 at Lamego confirmed him in the royal title, and in 1181 gave to the kingdom a code of laws and a constitution. Alphonso extended his dominions to the borders of Algarve, and took Santarem in 1143. The capture of Lisbon (1147) which was effected by the aid of some English Crusaders and others, was one of the most brilliant events of his warlike life. The succeeding reigns from Alphonso I to Dionysius (1279) are noteworthy chiefly for the conquest of Algarve (1251) and a conflict with the pope, who several times put the kingdom under interdict. Dionysius' wise encouragement of commerce, agriculture, manufactures, and navigation laid the foundation of the future greatness of Portugal. He liberally patronized learning, and founded a university at Lisbon, transferred in 1308 to Coimbra. By these and other acts of a wise and beneficent administration he earned the title of *father of his country.* He was succeeded by Alphonso IV, who in conjunction with Alphonso II of Castile defeated the Moors at Salado in 1340. He murdered Inez de Castro, the wife of his son Pedro (1355) (see *Inez de Castro*), who succeeded him. Dying in 1367, Pedro I was succeeded by Ferdinand, on whose death in 1383 the male line of the Burgundian princes became extinct. His daughter Beatrice, wife of the King of Castile, should have succeeded him; but the Portuguese were so averse to a connection with Castile that John I, natural son of Pedro, grand-master of the order of Avis (founded in 1162), was saluted king by the estates. In 1415 he took Ceuta, on the African coast, the first of a series of enterprises which resulted in those great expeditions of discovery on which the renown of Portugal rests. In this reign were founded the first Portuguese colonies, Porto Santo (1418), Madeira (1420), the Azores (1433), and those on the Gold Coast. The reigns of his son Edward (1433-38) and his grandson Alphonso V were less brilliant than that of John I; but the latter was surpassed by that of John II (1481-95), perhaps the ablest of Portugal's rulers. In his reign began a violent struggle with the nobility, whose power had become very great under his indulgent predecessors. The expeditions of discovery were continued with ardor and scientific method. Bartolommeo Diaz doubled the Cape of Good Hope in 1487, and Vasco da Gama reached India in 1498. In 1500 Cabral took possession of Brazil. (See *Colony.*) While these great events were still in progress John II was succeeded by his cousin Emanuel (1495-1521). The conquests of Albuquerque and Almeida made him master of numerous possessions in the islands and mainland of India, and in 1518 Lope de Soares opened a commerce with China. Emanuel ruled from Bab el Mandeb to the Straits of Malacca, and the power of Portugal had now reached its height. In the reign of John III, son of Emanuel (1521-57), Indian discoveries and commerce were still further extended; but the rapid accumulation of wealth through the importation of the precious metals, and the monopoly of the commerce between Europe and India, proved disadvantageous to home industry. The wisdom which had hitherto so largely guided the counsels of the kings of Portugal now seemed to forsake them. The Inquisition was introduced (1536), and the Jesuits were admitted (1540). Sebastian, the grandson of John III, who had introduced the Jesuits, having had his mind inflamed by them against the Moors of Africa, lost his life in the battle against these infidels (1578), and left his throne to the disputes of rival candidates, of whom the most powerful, Philip II of Spain, obtained possession of the kingdom by the victory of Alcantara. The Spanish yoke was grievous to the Portuguese, and many efforts were made to break it; but the power of Philip was too great to be shaken. Portugal continued under the dominion of Spain till 1640, and her vast colonial possessions were united to the already splendid acquisitions of her rival. But these now began to fall into the hands of the Dutch, who, being provoked by hostile measures of Philip, attacked the Portuguese as well as the Spanish possessions both in India and America. They deprived the Portuguese of the Moluccas, of their settlements in Guinea, of Malacca, and of Ceylon. They also acquired about half of Brazil, which, after the reës-

tablishment of Portuguese independence, they restored for a pecuniary compensation. In 1640, by a successful revolt of the nobles, Portugal recovered her independence, and John IV, Duke of Braganza, reigned till 1656, when he was succeeded by Alphonso VI. Alphonso ceded Tangier and Bombay to England as the dowry of his daughter, who became the queen of Charles II. Pedro II, who deposed Alphonso VI, concluded a treaty with Spain (1668), by which the independence of the country was acknowledged. During the long reign of John V (1706-50) some vigor was exerted in regard to foreign relations, while under his son and successor Joseph I (1750-77) the Marquis of Pombal, a vigorous reformer such as Portugal required, administered the government. On the accession of Maria Francisca Isabella, eldest daughter of Joseph, in 1777, the power was in the hands of an ignorant nobility and a not less ignorant clergy. In 1792, on account of the sickness of the queen, Juan Maria José, Prince of Brazil (the title of the prince-royal until 1816), was declared regent. His connections with England involved him in war with Napoleon; Portugal was occupied by a French force under Junot, and the royal family fled to Brazil. In 1808 a British force was landed under Wellington, and after some hard fighting the decisive battle of Vimeira took place (August 21), which was followed by the Convention of Cintra and the evacuation of the country by the French. The French soon returned, however; but the operations of Wellington, and in particular the strength of his position within the lines of Torres Vedras, forced them to retire. The Portuguese now took an active part in the war for Spanish independence. On the death of Maria, in 1816, John VI ascended the throne of Portugal and Brazil, in which latter country he still continued to reside. The absence of the court was viewed with dislike by the nation, and the general feeling required some fundamental changes in the government. A revolution in favor of constitutional government was effected without bloodshed in 1820, and the king invited to return home, which he now did. In 1822 Brazil threw off the yoke of Portugal, and proclaimed Dom Pedro, son of John VI, emperor. John VI died in 1826, having named the Infanta Isabella Maria regent. She governed in the name of the Emperor of Brazil, Dom Pedro IV of Portugal, who granted a new constitution, modeled on the French, in 1826. In this year he abdicated the Portuguese throne in favor of his daughter Maria da Gloria, imposing on her the condition of marrying her uncle Dom Miguel, who was entrusted with the government as regent; but the absolutist party in Portugal set up the claim of Dom Miguel to an unlimited sovereignty, and a revolution in his favor placed him on the throne in 1828. In 1831 Dom Pedro resigned the Brazilian crown, and returning to Europe succeeded in overthrowing Dom Miguel, and restoring the crown to Maria in 1833, dying himself in 1834. In 1836 a successful revolution took place in favor of the restoration of the constitution of 1820, and in 1842 another in favor of that of 1826. Maria died in 1853. Her husband, Ferdinand of Saxe-Coburg (Dom Ferdinand II), became regent for his and her son, Pedro V, who himself took the reins of government in 1855. Pedro died in 1861, and was succeeded by his brother, Louis I. Louis died in 1889, and was succeeded by his son, Carlos I. During these latter reigns the state of Portugal was generally fairly prosperous and progressive. King Carlos was assassinated by revolutionists Feb. 1, 1908, with his oldest son, the second son, born 1889, ascending the throne under title of Manuel II. In the recent division of Africa between the nations Portugal lost part of her territory in that continent.

The dissatisfaction of the people with the methods pursued by the government, which was manifested in the assassination of Carlos I, grew still more marked under his injudicious youthful successor and the corrupt and expensive administration of the departmental officials, and on October 3, 1910, a sudden revolutionary movement broke out in the streets of Lisbon. Socialistic and republican sentiment had invaded the army, many of the troops joining the revolutionists, and the outbreak made such rapid and successful progress that by the 5th Manuel had fled the kingdom and a republic was proclaimed, under the presidency of Theophile Braga, a poet and historian and a man of peaceful sentiments, but a highly esteemed leader among the republicans. A cabinet of able men was chosen, the government of Portugal was completely changed, and in a short time a well-organized republican administration was established and fully accepted by the people. A decree issued soon after banished forever all members of the Braganza royal family, including King Manuel, from Portuguese territory. Another decree revived the obsolete laws banishing all Jesuits from Portugal and suppressing

all convents, monasteries, hospices, and religious establishments of any kind. Education was also secularized.

Language and Literature.— The differences between Portuguese and Spanish languages are of comparatively modern origin, the two languages being very nearly alike in the time of Alphonso I. The dialect of Spanish spoken in Portugal at the beginning of the monarchy was the Galician, which was also that of the court of Leon; but that court subsequently adopted the Castilian, which beame the dominant language of Spain. The decline of the Galician dialect in Spain and the formation of the Portuguese language finally determined the separation of Spanish and Portuguese, and from cognate dialects made them distinct languages. Portuguese is considered to have less dignity than the Spanish, but is superior to it in flexibility. In some points of pronunciation it more resembles French than Spanish. It is also the language of Brazil. The oldest monuments of Portuguese literature do not go back further than the twelfth and thirteenth centuries, and the native literature could then boast of nothing more than popular songs. The first Portuguese collection of poetry (*cancioneiro*) was made by King Dionysius, and was published under the title of *Cancioneiro del Rey Dom Diniz.* Some poems on the death of his wife are attributed to Pedro I, husband of Inez de Castro. The sons and grandsons of John I were poets and patrons of the troubadours. Sà de Miranda marks the transition from the fifteenth to the sixteenth century and the separation of the Portuguese from the other Spanish dialects and from the language of the troubadours. The sixteenth century is the classic era of Portuguese literature. The chief names are Sà de Miranda, Antonio Ferreira, Camoens, Diego Bernardes, Andrade Caminha, and Alvares do Oriente. The principal epic and the greatest poem in the Portuguese literature, almost the only one which has acquired a European reputation, is *Os Lusiadas* (The Portuguese) of Camoens (1524-80), which has placed its writer in the rank of the few great poets of the highest class whose genius is universally recognized. After Camoens as an epic writer comes Cortereal, who has celebrated the siege of Diù and the shipwreck of Sepulveda. Vasco de Lobeiro, Francisco Moraes, and Bernardim Ribeiro are among the leading romance writers. The drama also began to be cultivated in the sixteenth century. Sà de Miranda studied and imitated Plautus. Ferreira composed the first regular tragedy, *Inez de Castro.* Camoens wrote several theatrical pieces, among which are *Amphitryon and Seleucus.* Barros, also a romance writer, wrote a *History of the Conquest of India.* The *Commcntaries* of Alphonso d'Albuquerque, by a nephew of the conqueror; the *Chronicle of King Manuel and of Prince John,* by Damian de Goes; the *History of the Discovery and Conquest of the Indies,* by Lopès de Castanheda; *the Chronicle of King Scbastian,* by Diego Bernardo Cruz, are all works of merit. By the opening of the seventeenth century Portugal's literary greatness had been succeeded by one of great activity, though of little real power. A crowd of epics were stimulated into being by the success of the *Lusiad.* During this period the native drama became almost extinct, being overshadowed by the Spanish. In the eighteenth century the influence of the French writers of the age of Louis XIV so completely dominated Portuguese literature that it became almost entirely imitative. Towards the close of this century two writers appeared who have formed schools, Francisco Manoel do Nascimento (1734-1829), an elegant lyrist, and Barbosa du Bocage, who introduced an affected and hyperbolical style of writing. Among more recent poets possessing some claim to originality may be mentioned Mouzinho de Albuquerque, Feliciano Castilho, Herculano de Carvalho, Almeida Garrett, Thomaz Ribeiro and Theophile Braga; among novelists are Carvalho, Garrett, Julio Diniz, and Rebello de Silva. Among historians Braga stands first. Through the efforts of these and others Portuguese literature has again begun to assume an aspect of native vigor. In art Portugal has never distinguished herself.

Portuguese Man-of-war, the popular name of certain marine animals, allied to the Medusidæ or jellyfishes, and included in the class Hydrozoa. See *Physalia.*

Portulaceæ (pōr-tu-lā′se-ē), or PURSLANES, a small nat. order of polypetalous exogens, consisting of annual, perennial, herbaceous, or shrubby plants, occurring in all the hotter or milder parts of the world. The only species of any importance is *Portulăca oleracĕa,* or common purslane, which is a fleshy, prostrate annual, sometimes used in salads. It is naturalized in most of the warmer parts of the world, and is often a troublesome weed.

Portumnus (por-tum′nus), or PORTU′NUS, the Roman god

of harbors. The *Portumnalia* were yearly celebrated in his honor.

Port Victoria, the capital of the Seychelles, in the island of Mahé. See *Mahé.*

Port Wine, is a very strong, full-flavored wine produced in the upper valley of the Douro, Portugal, and has its name from the place of shipment, Oporto. It is slightly astringent, and has a color varying from pink to red. It requires three or four years to mature, and with age becomes tawny; it receives a certain proportion of spirit to hasten the process of preparation. The vintage begins early in September and extends into October. The port wine trade was established in 1678, chiefly to supply Britain. The total annual production is put at from 110,000 to 120,000 pipes, of which at present 40,000 are, on an average, exported. Since 1876 the vineyards of the Douro have suffered greatly from the phylloxera. Large quantities of artificial port are made, particularly in the United States.

Poseidōn (po-sī′dōn), the Greek god of the sea, identified by the Romans with the Italian deity Neptunus. A son of Kronos and Rhea, and hence a brother of Zeus, Hēra, and Dēmētēr, he was regarded as only inferior in power to Zeus. His usual residence was in the depths of the sea near Ægæ, in Eubœa, and the attributes ascribed and most of the myths regarding him have reference to the phenomena of the sea. The horse, and more particularly the war-horse, was sacred to Poseidōn, and one of the symbols of his power. During the Trojan war Poseidōn was the constant enemy of Troy, and after its close he is described as thwarting the return of Ulysses to his home for his having killed Polyphēmus, a son of the god. Poseidōn was married to Amphitritē. His worship was common throughout Greece and the Greek colonies, but especially prevailed in the maritime towns. The Isthmian games were held in his honor. In works of art Poseidōn is represented with features resembling those of Zeus, and often bears the trident in his right hand. A common representation of him is as drawn in his chariot over the surface of the sea by hippocamps (monsters like horses in front and fishes behind) or other fabulous animals.

Posen (pō′zen), a fortified town in Prussia, capital of the province of the same name and an archbishop's see, stands on the Warthe, 149 miles east by south of Berlin. It is surrounded by two lines of forts, is built with considerable regularity, has generally fine wide streets, and numerous squares or open spaces. The most noteworthy public buildings are the cathedral, in the Gothic style (1775), the town parish church, a fine building in the Italian style, both Roman Catholic; the town-house (1508), with a lofty tower; the Raczynski Library; the municipal archive building, etc. The manufactures consist chiefly of agricultural machines, manures, woolen and linen tissues, carriages, leather, lacquerware, etc. There are also breweries and distilleries. Pop. 117,014.— The province is bounded by West Prussia, Russian Poland, Silesia, and Brandenburg; area, 11,178 sq. miles. The surface is flat, and extensively occupied by lakes and marshes. A small portion on the northeast belongs to the basin of the Vistula; all the rest to the basin of the Oder. The soil is mostly of a light and sandy character, yielding grain, millet, flax, hemp, tobacco, and hops. Forests occupy 20 per cent. of the surface. The inhabitants include many Germans, especially in the towns, but considerably more than half are Poles, Posen being one of the acquisitions which Prussia made by the dismemberment of Poland. It is divided into the governments of Posen and Bromberg. Pop. 1,888,055.

Posidonius (pos-i-dō′ni-us), a Stoic philosopher, born in Syria, about 135 B.C. He settled as a teacher at Rhodes, whence he is called the Rhodian. The most distinguished Romans were his scholars, and Cicero was initiated by him into the Stoic philosophy. Removing to Rome in 51 B.C., he died not long after. In his physical investigations he was more a follower of Aristotle than of the Stoic school.

Posilipo (po-zē′lip-po), an eminence which bounds the city of Naples on the west. It is traversed by a tunnel called the Grotto of Posilipo, 2244 feet long, from 21 to 32 feet wide, with a height varying from 25 to 69 feet, through which runs the road to Pozzuoli. This tunnel is remarkable for its antiquity, being constructed in the reign of Augustus. A second tunnel has recently been constructed for the tramway from Naples to Pozzuoli.

Positive (poz′i-tiv), in photography, a picture obtained by printing from a *negative*, in which the lights and shades are rendered as they are in nature. See *Photography.*

Positive Philosophy, or Positivism, is the name given by Auguste Comte to the philosophical and religious system promulgated by him (chiefly in his *Cours*

de Philosophie Positive, 1830–42, and his posthumous *Essays on Religion*). The distinguishing idea which lies at the root of this twofold system is the conception that the anomalies of our social system cannot be reformed until the theories upon which it is shaped have been brought into complete harmony with science. The leading ideas of Comte's philosophy are (1) the classification of the sciences in the order of their development, proceeding from the simpler to the more complex — mathematics, astronomy, physics, chemistry, biology and sociology; and (2) the doctrine of the 'three stages,' or the three aspects in which the human mind successively views the world of phenomena, namely, the theological, the metaphysical, and the scientific. This theory of the three stages, one of the most characteristic of Comte's system, is thus succinctly stated by George Henry Lewes:

'Every branch of knowledge passes successively through three stages. 1st, the *supernatural* or fictitious; 2d, the *metaphysical* or abstract; 3d, the *positive* or scientific. The first is the necessary point of departure taken by human intelligence; the second is merely a stage of transition from the supernatural to the positive; and the third is the fixed and definite condition in which knowledge is alone capable of progressive development. In the *supernatural* stage the mind seeks after *causes;* aspires to know the *essences* of things and their modes of operation. It regards all effects as the productions of supernatural agents, whose intervention is the *cause* of all the apparent anomalies and irregularities. Nature is animated by superhuman beings. Every unusual phenomenon is a sign of the pleasure or displeasure of some being adored and propitiated as a God. In the metaphysical stage, which is only a modification of the former, but which is important as a transitional stage, the supernatural agents give place to abstract forces (personified abstractions) supposed to inhere in the various substances, and capable themselves of engendering phenomena. The highest condition of this stage is when all these forces are brought under one general force named nature. In the positive stage the mind, convinced of the futility of all inquiry into causes and essences, applies itself to the observation and classification of laws which regulate effects; that is to say, the invariable relations of succession and similitude which all things bear to each other. The highest condition of this stage would be to be able to represent all phenomena as the various particulars of one general view.'

The religious side of positivism has somewhat the nature of an apology or afterthought. After doing away with theology and metaphysics, and reposing his system on science or positive knowledge alone, Comte discovered that there was something positive in man's craving for a being to worship. He therefore had recourse to what he calls the cultus of humanity considered as a corporate being in the past, present, and future, which is spoken of as the *Grand Être*. This religion, like other forms of worship, requires for its full development an organized priesthood, temples, etc. Under the régime of positive religion Comte would include the political and social side of his system. Hence some of his followers look forward to the establishment of an international republic, composed of the five great western nations of Europe, destined ultimately to lead the whole world. Society in this great commonwealth will be reorganized on the basis of a double direction or control, that of the temporal or material authority, and that of the spiritual or educating body.

Among leading thinkers of the last generation Comte's philosophy found many admirers and some adherents, partly, doubtless, on account of its striking originality, partly by reason of the author's powerful personality. They included such intellects as George Henry Lewes, John Stuart Mill, Richard Congreve, Harriet Martineau, and others. Later investigators, however, have not sustained the favorable verdict of those who judged from a nearer mental perspective. The critiques of Herbert Spencer, Professor Huxley, John Fiske, and Dr. McCosh are specially important; also the reply of M. Littré, the foremost French disciple of Comte, to Mill's elaborate critique of positivism. Though there is still a faithful following of the positive philosophy, it is not so distinguished as formerly; while the professed disciples of the religion of humanity are few and rare.

Posse Comitatus (pos'e com-i-tā'-tus), in law, 'the power of the county,' that is, the citizens who are summoned to assist an officer in suppressing a riot or executing any legal process.

Postal Savings Banks. The system of postal savings banks, adopted for the United States by Act of Congress in 1910, has long been in existence, with very satisfactory results, in many foreign countries. The deposits in 1908 in Great

Britain were $781,794,533; in Italy, $285,442,694; in France, $276,655,969; in Belgium, $134,040,979; and in Russia, $128,873,169. They extend to many other countries, with deposits under $100,000,000. The total for the world aggregated $1,989,299,815, the depositors numbering 40,320,303. Comparison showed that in ten years the number of depositors have doubled and that deposits had increased 75 per cent. Under the new law in the United States an experimental bank was opened in each State on January 1, 1911. The response has been so satisfactory that many others have been added. Any sum from $1 to $100 is accepted, and interest paid at the rate of 2 per cent.

Postern (pos'tern), in fortification, is a small gate usually in the angle of the flank of a bastion, or in that of the curtain, or near the orillon, descending into the ditch.

Post-glacial. See *Post-tertiary.*

Posting (pōst'ing), traveling by means of horses hired at different stations on the line of journey, a system established in England as early as the reign of Edward II.

Postmaster-General, the chief officer of the Postoffice Department of the executive branch of the government of the United States. His duties are to establish postoffices and appoint postmasters, and, generally, to superintend the business of the department in all the duties assigned to it.

Post-mill, a form of windmill so constructed that the whole fabric rests on a vertical axis, and can be turned by means of a lever. See *Windmill.*

Post-obit Bond, a bond given for the purpose of securing to a lender a sum of money on the death of some specified individual from whom the borrower has expectations. Such loans are not only generally made at usurious rates of interest, but usually the borrower has to pay a much larger sum than he has received in consideration of the risks the lender runs in the case of the obliger predeceasing the person from whom he has expectation. If, however, there is a gross inadequacy in the proportions amounting to fraud, a court of equity will interfere.

Postoffice, a department of the government of a country charged with the conveyance of letters, newspapers, parcels, etc., and also since recent times with the transmission of telegrams. From the time of Cyrus the Elder down to the middle ages various rulers had concocted more or less effective systems of postal communication throughout their dominions; but the 'post' as we know it to-day is an institution of very modern growth. The first traces of a postal system in England are observed in the statutes of Edward III, and the postoffice as a department of government took its rise in the employment of royal messengers for carrying letters. The first English postmaster we hear of was Sir Brian Tuke, his date being 1533. In 1543 a post existed by which letters were carried from London to Edinburgh within four days, but this rate of transportation, rapid for that period, lasted but a short time. James I improved the postal communication with Scotland, and set on foot a system for forwarding letters intended for foreign lands. In 1607 he appointed Lord Stanhope postmaster for England, and in 1619 a separate postmaster for foreign parts. Up to within a short time of the reign of Charles I, merchants, tradesmen, and professional men availed themselves of any means of conveyance that offered, or employed express messengers to carry their correspondence. The universities and principal cities had their own posts. The foreign merchants settled in London continued to send their foreign letters by private means long after the establishment of the foreign post. In 1632 Charles I forbade letters to be sent out of the kingdom except through the postoffice. In 1635 he established a new system of posts for England and Scotland. All private and local posts were abolished, and the income of the postoffices was claimed by the king. Interrupted by the civil wars, peace had no sooner been restored than a more perfect postal system was established. In 1683 a penny post was set up in the metropolis. During the government of William III acts of parliament were passed which regulated the internal postal system of Scotland; and under Queen Anne, in 1711, the postal system of England was arranged on the method on which, with some modifications, it continued till near the middle of the nineteenth century. Sir Rowland Hill, the author of the system at present existing, gave the first intimation of his plan in a pamphlet in the year 1837. He soon had the satisfaction of seeing the legislature adopt his plan, in its principal features at least, and on the 10th January, 1840, the uniform rate of 1*d.* per ½ oz. for prepaid letters came into operation. The success of Rowland Hill's scheme was vastly favored by the invention of the adhesive postage stamp, the

idea of which would seem to be due to Mr. James Chalmers, of Dundee. Subsequently many important improvements have been made in the management of the postoffice business. One of these was the adoption of postal carriages on railways, by which the delivery of letters was greatly accelerated. These carriages are fitted with an apparatus into which letter-bags are thrown without stopping or even materially slackening the speed of the train; while the sorting of letters, etc., proceeds during the transit. The reduction of the cost of carriage, the great increase in the rapidity of transmission, the immense development of commerce, together with the increase of population, have had the effect of enormously increasing the work done by the postoffice. In recent years an immense stride has been taken in the improvement of postal communication between different countries by the formation of the International Postal Union in 1885. All the states of the Union form a single postal territory, having a uniform charge for the letters, etc., passing between the several states of which it is composed.

In France a system of postal messengers for administrative purposes was established under Louis XI in 1464, and it is to France that the term *post* is due. A general postal system in France was set on foot in 1576. Up to near the end of the eighteenth century the French posts were farmed out. The postal reform introduced into England by Sir Rowland Hill was to some extent adopted in France in 1849, but it is only recently that the French postal arrangements have been rendered satisfactory. In Germany the first post was established in Tyrol about the latter half of the fifteenth century by the Count of Thurn, Taxis, and Valsassina, and the administration of the postal system of the empire, with the revenues attached, remained until 1803 as a fief to this family. Many of the German states, however, had also a separate post of their own. The connection of the telegraphic with the postal system of Germany began in 1849. Since the establishment of the German Empire a uniform postal and telegraphic system has been organized for the whole of Germany. The Germans have paid great attention to their postal arrangements, and in some respects they are ahead of other countries. To Germany is due the introduction of post-cards, which were first proposed by Prussia at a postal conference held at Karlsruhe in 1865. The postal system of Italy arose in Piedmont about the year 1560, when the Duke of Savoy farmed out the transmission of letters to a postmaster-general. This arrangement continued until 1697, when Duke Victor Amadeus added the income of the postoffice to the revenue of the state, and from 1710 the administration was carried on directly by the state. Since the unification of Italy a reorganized system, including telegraphic and parcel transmissions, has been extended to the whole of the kingdom. In most of the other states of Europe a very perfect system also now obtains. The development of a postal system in the American colonies followed in the lines of that already established in Britain. The earliest mention of a postoffice in the colonies is in 1639, a postoffice for foreign letters being then established at Boston. In 1683 a postoffice was established in Pennsylvania by William Penn. In 1692 a postmaster-general for the American colonies was appointed, and a general postal system was soon after organized. Benjamin Franklin was postmaster-general in 1753-74, and numerous reforms were instituted under his management. In 1760 he arranged a stage-wagon to convey the mail from Philadelphia to Boston once a week, starting from each city on Monday morning and reaching its destination by Saturday night. In 1789 the Constitution conferred upon Congress the exclusive control of postal matters in the states. In 1790 there were but 75 postoffices in the country, and the whole sum received for postage was $37,935. At the close of the Civil war, in 1865, there were 20,000 postoffices, 140,000 miles of post route, and receipts of $14,500,000. In 1910 there were over 60,000 postoffices, 450,000 miles of postal routes, and a revenue of about $225,000,000. The number of pieces of all kinds which passed through the mails was over 14,000,000,000. The annual aggregate of letters for all the postoffices of the world is estimated at 30,000,000,000 and of newspapers at 15,000,000,000. The early post rates in this country were based more on the distance carried than the weight of the letter. Until 1816 the rate for a single letter (composed of a single piece) was, under 40 miles, 8 cents; under 90, 10 cents; under 150, 12½ cents; under 300, 17 cents; under 500, 20 cents; over 500, 25 cents. Some modifications were made in 1816, and in 1845 new rates were fixed, as follows: for a letter not over half an ounce in weight under 500 miles, 5 cents; over 300, 10 cents; and an additional rate for every extra half ounce or fraction thereof. In 1853 the rates were reduced to 3 cents for all

distances under 3000 miles, and 10 cents for all over that distance. In 1863 the rate was fixed at 3 cents for all letters within the United States of not more than half an ounce weight. The 1-cent postal card was adopted in 1873, and the 2-cent letter rate in 1883, the weight being increased in 1885 from a half ounce to an ounce. Rural free delivery has since been adopted, and extended until now it covers a great part of the country. In 1909 the 2-cent postal rate for letters was extended to foreign letters for Great Britain and Germany, in the latter case carriage in German mail ships being required.

In the United States, under present regulations, all mail matter is divided into four classes. The first class includes letters, post-cards, and anything closed against inspection: postage, 2 cents each oz. or additional fraction of an oz.; post-cards, 1 cent; registered letters, 8 cents in addition to postage. Second class matter includes all newspapers, periodicals, etc., issued as frequently as four times a year: postage, 1 cent per lb. or fraction thereof. When the newspapers, etc., are sent by persons other than the publishers the charge is 1 cent for each four ounces. Mail matter of the third class includes books, circulars, proof-sheets, etc.: postage, 1 cent for each 2 ozs.; limit of weight, 4 lbs. each package. The fourth class embraces merchandise and all matters not included in the other three classes: postage, 1 cent per oz.; limit of weight, 4 lbs. Prepayment of postage by stamps for all classes of matter is required.

A brief synopsis of offenses against the postal laws follows: No article may be mailed intended or adapted for any indecent or immoral use, or printed matter describing where such may be procured; also any letter or circular concerning any kind of lotteries, or any scheme for defrauding the public. It is unlawful, also, to send any threatening, inflammatory or libelous matter; thus dunning notices may not be sent on postal cards. The use of the mail to offer for sale any spurious or counterfeit note or money is a crime punishable by fine, imprisonment, or both. It is forbidden to open the letters, though unsealed, of other persons. To knowingly and willfully obstruct the mail renders liable to a fine of $100.

Post-pleiocene (pōst-plī′o-sēn), or POST-PLIOCENE, in geology, same as *Pleistocene.*

Post-tertiary (pōst-tėr′shâ-ri), in geology, the Lyellian term for all deposits and phenomena of more recent date than the Norwich or mammaliferous crag. It may be restricted so as only to include accumulations and deposits formed since the close of the glacial or boulder drift systems, and has been divided into three sections — *historic*, *prehistoric*, and *post-glacial.* The first comprises the peat of Great Britain and Ireland, fens, marshes, river deposits, lake silts, accumulations of sand drift, etc., containing human remains, canoes, metal instruments, remains of domestic animals, etc. The *prehistoric* comprises similar or nearly similar deposits, but the remains found in them are older, comprising stone implements, pile-dwellings, and extinct animals, as the Irish deer, mammoth, etc. To the *post-glacial* belong raised beaches, with shells of a more boreal character than those of existing seas, the shell-marl under peat, many dales and river valleys, as well as the common brick-clay, etc., covering submarine forests or containing the remains of seals, whales, the mammoth, rhinoceros, urus, hyæna, hippopotamus, etc.

Postulate (pos′tū-lāt), a position or supposition assumed without proof, being considered as self-evident, or too plain to require illustration. In geometry, the enunciation of a self-evident problem. Euclid has constructed his elements on the three following postulates: 1. Let it be granted that a straight line may be drawn from any one point to any other point. 2. That a terminated straight line may be produced to any length in a straight line. 3. That a circle may be described from any center at any distance from that center.

Potamogeton (pot-a-moj′e-ton), a genus of aquatic plants belonging to the nat. order Naiadaceæ. It has a perfect flower, a four-pointed perianth, four sessile anthers, four ovaries, and four drupes or nuts. Several species are indigenous to Britain, where they are known by the name of *pond-weed.*

Potash (pot′ash), or POTASSA, an alkaline substance obtained from the ley of vegetable ashes which is mixed with quicklime and boiled down in iron pots, and the residuum ignited, the substance remaining after ignition being common potash. It derives its name from the *ashes* and the *pots* (called potash kettles) in which the lixivium is (or used to be) boiled down. An old name was *vegetable alkali.* Potash in this crude state is an impure carbonate of potassium, which when purified is known in commerce as *pearl-ash.* It is used in the making of glass and soap, and large quantities of it are now produced from certain 'potash minerals' (especially carnallite), instead

of from wood ashes. What is known as *caustic potash* (hydrate of potassium, KHO) is prepared from ordinary potash. It is solid, white, and extremely caustic, *eating* into animal and vegetable tissues with great readiness. It changes the purple of violets to green, restores reddened litmus to blue, and yellow turmeric to reddish brown. It rapidly attracts humidity from the air, and becomes semi-fluid. It is fusible at a heat of 300°, and is volatilized at low ignition. It is used in surgery under the name of *lapis infernālis* or *lapis caustieus* for destroying warts, fungoid growths, etc., and may be applied beneficially to the bites of dogs, venomous serpents, etc. In chemistry it is very extensively employed, both in manufactures and as an agent in analysis. It is the basis of the common soft soaps, for which purpose, however, it is not used in its pure state. See *Potassium.*

Potash Water, an aerated water produced by mixing bicarbonate of potash with carbonic acid water in the proportion of 20 grains to each bottle of the water, or about half an ounce to the gallon. Bisulphate of potash, as being cheaper than tartaric acid, is sometimes used (but should not be) with carbonate of soda to produce the common effervescing drink. A valuable medicinal water is compounded of a certain proportion of bromide of potassium. See *Aerated Waters.*

Potassium (po-tas'i-um; a Latinized term from *potash*), a name given to the metallic basis of potash, discovered by Davy in 1807, and one of the first fruits of his electro-chemical researches; symbol, K; atomic weight, 39.1. Next to lithium it is the lightest metallic substance known, its specific gravity being 0.865 at the temperature of 60°. At ordinary temperatures it may be cut with a knife and worked with the fingers. At 32° it is hard and brittle, with a crystalline texture; at 50° it becomes malleable, and in luster resembles polished silver; at 150° it is perfectly liquid. Potassium has a very powerful affinity for oxygen, which it takes from many other compounds. A freshly exposed surface of potassium instantly becomes covered with a film of oxide. The metal must therefore be preserved under a liquid free from oxygen, rock-oil or naphtha being generally employed. It conducts electricity like the common metals. When thrown upon water it decomposes that liquid with evolution of hydrogen, which burns with a pale violet flame, owing to the presence in it of potash vapor. *Chloride* of potassium (KCl) is known in commerce as 'muriate of potash,' and closely resembles common salt (chloride of sodium). It is obtained from potassic minerals, the ashes of marine plants (kelp), and from sea-water or brine springs. It enters into the manufacture of saltpeter, alum, artificial manures, etc. *Bromide* and *iodide* of potassium are useful drugs. (For the *carbonate* of potassium see *Potash.*) *Bicarbonate* of potassium is obtained by exposing a solution of the carbonate to the air, carbonic acid being imbibed from the atmosphere, and crystals being deposited; or it is formed more directly by passing a current of carbonic acid gas through a solution of the carbonate of such a strength that crystals form spontaneously. It is much used in medicine for making effervescing drinks. *Nitrate* of potassium is *niter*, or *saltpeter.* (See *Niter.*) *Sulphate* of potassium (K_2SO_4) is used medicinally as a mild laxative, in making some kinds of glass and alum, and in manures. The *bisulphate* ($KHSO_4$) is used as a chemical reagent, and in calico-printing and dyeing. *Chlorate* of potassium ($KClO_3$) is employed in the manufacture of lucifer matches, in certain operations in calico-printing, and for filling friction-tubes for firing cannon. It is a well-known source of oxygen. The *bichromate* ($K_2Cr_2O_7$) is also used in calico-printing and dyeing. *Cyanide* of potassium (KCN_7) is much used in photography.

Potato (pō-tā'tō; *Solānum tuberōsum*), a plant belonging to the nat. order Solanaceæ, which also includes such poisonous plants as nightshade, henbane, thorn-apple and tobacco. We owe

Tubers of Potato.

this esculent to western South America, where it still grows wild, chiefly in the region of the Andes, producing small,

tasteless, watery tubers. The potato was first introduced into Europe by the Spaniards after the conquest of Peru, by whom it was spread over the Netherlands, Burgundy, and Italy before the middle of the sixteenth century. In Germany it is first heard of as a rarity in the time of Charles V. Sir John Hawkins, Sir Francis Drake, and Sir Walter Raleigh are all credited with the first introduction of the tuber into England (1565). Although the potato was tolerably widely distributed on the continent of Europe before its appearance in Britain, it seems to have been cultivated more as a curiosity than as an article of food, and Ireland is said to have been the country in which it was first cultivated on a large scale for food. In the course of the eighteenth century it became a favorite article of food with the poorer classes in Germany; but in France there existed so violent a prejudice against it that it did not come into general use until towards the end of the century. The potato is a perennial plant, with angular, herbaceous stems, growing to the height of 2 or 3 feet; leaves pinnate; flowers pretty large, numerous, disposed in corymbs, and colored violet, bluish, reddish, or whitish. The fruit is globular, about the size of a gooseberry, reddish brown or purplish when ripe, and contains numerous small seeds. The tubers, which furnish so large an amount of the food of mankind, are really underground shoots abnormally dilated, their increase in size having been greatly fostered by cultivation. Their true nature is proved by the existence of the 'eyes' upon them. These are leaf-buds, from which, if a tuber or a portion of it containing an eye is put into earth, a young plant will sprout, the starchy matter of the tuber itself supplying nutriment until it throws out roots and leaves, and so attains an independent existence. The potato succeeds best in a light, sandy loam containing a certain proportion of vegetable matter. The varieties are very numerous, differing in the time of ripening, in their form, size, color, and quality. New ones are readily procured by sowing the seeds, which will produce tubers the third year, and a full crop the fourth. But the plant is usually propagated by sowing or planting the tubers, and it is only in this way that any one variety can be kept in cultivation. Like all plants that are extensively cultivated, and under very different circumstances of soil, climate, and artificial treatment, the potato is extremely subject to disease. Among the diseases to which it is liable are the 'curl,' the 'scab,' the 'dry rot,' and the 'wet rot,' besides the more destructive potato disease proper. The principal feature of the curl is the curling of the shoots soon after their first appearance. After that they make little progress, and sometimes disappear altogether. The plants produce no tubers, or only a few minute ones, which are unfit for food. The scab is a disease that attacks the tubers, which become covered with brown spots on the outside, while underneath the skin is a fungus called *Tubercinia scabies*. The dry rot is characterized by a hardening of the tissues, which are completely gorged with mycelium (the vegetative part of fungi). In the disease called wet rot the potato is affected much in the same way as by the dry rot; but the tubers, instead of becoming hard and dry, are soft. The fungus present in wet rot is supposed to be the same that accompanies dry rot. The potato disease *par excellence* was prevalent on both sides of the Atlantic in the year 1845. Usually the first sign of this disease is the appearance of brown patches upon the haulms and leaves. These spots appear about the time the plants attain their full growth, and when carefully examined are found to be surrounded by a ring of a paler color. The whole of this outer ring is infested with a fungus called the *Botrytis* or *Peronospŏra infestans*, which is a constant accompaniment of the disease, if not its cause. If the weather be dry the progress of the disease is slow, but if a moist warm day supervene it will be found that the mold spreads with great rapidity, and sometimes the whole plant becomes putrid in a few days. The disease first shows itself in a tuber by appearing as a brownish spot, and the part affected may be cut out, leaving the remainder quite wholesome. None of the plans adopted for mitigating the potato disease have been very effective. The potato is also attacked by various insects, the most destructive being the Colorado beetle. The tubers consist almost entirely of starch, and being thus deficient in nitrogen, should not be too much relied on as a staple article of diet. Potatoes are extensively used as a cattle-food, and starch is also manufactured from them. In Maine, Vermont, and Northern New York this is an important industry. Enormous crops of this valuable esculent are grown in the United States, and much attention has been given to their improvement. Its cultivation has also extended widely over the earth.

Potato-bug, a name given in America to the *Colorado beetle* (which see), from the injury caused by it to the potato.

Potchefstroom (pot'shef-strōm), a town in the Transvaal, South Africa, on the Mooi River, about 25 miles N. of the Vaal River. Pop. (1904) 9348.

Potemkin (po-tem'kin), GREGORY ALEXANDROVITCH, a Russian general, a favorite of the Empress Catharine II, born in 1736; died in 1791. Descended from an ancient Polish family, and early trained to the military profession, he soon after her accession attracted the attention of Catharine, who appointed him colonel and gentleman of the chamber. Soon after he gained the entire confidence of Catharine, and became her avowed favorite. From 1776 till his death, a period of more than fifteen years, he exercised a boundless sway over the destinies of the empire. In 1783 he suppressed the khanate of the Crimea, and annexed it to Russia. In 1787, being desirous of expelling the Turks from Europe, he stirred up a new war, in the course of which he took Oczakoff by storm (1788). In the following year (1789) he took Bender, but as the finances of Russia were now exhausted Catharine was desirous of peace. Potemkin, however, resolved on conquering Constantinople, resisted the proposal to treat with the enemy, and went to St. Petersburg to win over the empress to his side (March, 1791); but during his absence Catharine sent plenary powers to Prince Repnin, who signed a treaty of peace. When Potemkin learned what had been done he set out for the army, resolved to undo the work of his substitute; but he died on the way, at Nicolaieff.

Potential (pō-ten'shul), a term in physics. If a body attract, according to the law of universal gravitation, a point whether external or of its own mass, the sum of the quotients of its elementary masses, each divided by its distance from the attracted point, is called the *potential*. The potential at any point near or within an electrified body is the quantity of work necessary to bring a unit of positive electricity from an infinite distance to that point, the given distribution of electricity remaining unaltered.

Potential Energy, that part of the energy of a system of bodies which is due to their relative position, and which is equal to the work which would be done by the various forces acting on the system if the bodies were to yield to them. If a stone is at a certain height above the earth's surface the potential energy of the system consisting of the earth and stone, in virtue of the force of gravity, is the work which might be done by the falling of the stone to the surface of the earth.

Potential Mood, that mood of a verb which expresses an action, event, or circumstance as merely possible, formed in English by means of the auxiliaries *may* or *can*.

Potentilla (pō-ten-til'a), a genus of herbaceous perennials, nat. order Rosaceæ, found chiefly in the temperate and cold regions of the northern hemisphere, containing about 120 species. They are tall or procumbent herbs, rarely undershrubs, with digitate or unequally pinnate leaves, and yellow, red, purple, or white flowers. Some are favorite garden flowers. *P. anserīna* is also called silver-weed, goose-grass, or wild tansy, the leaves of which are greedily devoured by geese; and *P. fragariastrum*, barren strawberry. *P. reptans* is a well-known creeping plant with conspicuous yellow flowers. The roots of *P. anserīna* are eaten in the Hebrides, either raw or boiled. *P. Tormentilla* is used in Lapland and the Orkney Islands both to tan and to dye leather, and also to dye worsted yarn. It is also employed in medicine as a gargle in the case of enlarged tonsils and other diseases of the throat, and for alleviating gripes in cases of diarrhœa.

Potenza (pō-tent'sà), a town of Southern Italy and a bishop's see, capital of the province of the same name, on a hill of the Apennines near the Basento, 85 miles E. S. E. of Naples. It is walled, and is indifferently built. It suffered severely by earthquake in 1857, most of the buildings having fallen and many lives being lost. Pop. (1901) 12,313.—The province is partly bounded by the Gulf of Taranto and the Mediterranean. Its chief productions are maize, hemp, wine, silk, cotton.

Poterium (pō-tē'ri-um), a genus of plants, nat. order Rosaceæ and suborder Sanguisorbeæ. *P. Sanguisorba*, or salad-burnet, which grows on dry and most frequently chalky pastures, is said to be native about Lake Huron. It is valuable for fodder, and is used in salad. It has pinnate leaves and tall stems surmounted by dense heads of small flowers.

Poti (pō'tyē), a Russian town in Transcaucasia, on the eastern coast of the Black Sea. It has extensive harbor works, and is connected by railway with Tiflis, but the trade is being drawn away by Batoum. Pop. 7666.

Pot Metal, an inferior kind of brass (copper, 10 parts; lead, 6 to 8), used for making various large vessels employed in the arts. Also a kind

of stained glass in which the colors are incorporated with the substance by being added while the glass is in a state of fusion.

Potocki (po-tots'ki), an ancient Polish family, taking its name from the castle of Potok, and still holding possessions in Galicia and the Ukraine. Among its most distinguished members was Count Ignatius, grand marshal of Lithuania before the downfall of Poland, and a fellow-patriot of Kosciusko, born 1751. In 1791 he took refuge in Saxony, and published a political tract upon the establishment and fall of the constitution, returning, however, to share in the last struggle for independence. He then passed some time in the prisons of St. Petersburg and Warsaw, and died at Vienna 1809.

Potomac (pō-tō'mak), a river which forms the boundary between Maryland and Virginia, passes Washington, and after a course of nearly 400 miles flows into Chesapeake Bay, being about 8 miles wide at its mouth. The termination of the tidewater is at Washington, about 125 miles from the sea, and the river is navigable for large ships for that distance. Above Washington are several falls which obstruct navigation.

Pot'oroo. See *Kangaroo Rat.*

Potosi (pot-o-sē'; common pronunciation, po-tō'sē), a city of Southern Bolivia, in the department of same name, on the slope of the mountain mass of Cerro de Pasco, more than 13,000 feet above the sea-level, in bare and barren surroundings. It is regularly built, and has a cathedral, a mint, etc. It has long been celebrated for its silver mines, which were at one time exceedingly productive, and have again begun to show an improved return. The city was founded in 1547, and the population increased so rapidly that in 1611 it amounted to 150,000, but the 1906 estimate was 23,450.—The department has an area of 50,000 square miles, and is celebrated for its mineral wealth, especially silver. Pop. 325,615.

Pot-pourri (pō-pö-rē; French) signifies the same as *olla podrida* (which see); also, and more generally, a musical medley, or a literary composition made up of parts put together without unity or bond of connection.

Potsdam (pots'dam), a town in Prussia, a bishop's see, capital of the province of Brandenburg, and the second royal residence of the kingdom, is charmingly situated in the midst of wooded hills, 17 miles southwest of Berlin, on the Havel, which here has several lakes connected with it. It is, on the whole, one of the handsomest and most regularly built towns in Germany, and with its suburbs now covers a large space. The principal edifices are the royal palace (remodeled 1750), with interesting memorials of Frederick the Great; Garrison Church, containing the tombs of William I and Frederick the Great; the Nikolai Church, the French Protestant Church, built after the model of the Pantheon at Rome; the town-house; and the Barberini Palace, erected by Frederick the Great in imitation of that at Rome, but rebuilt in 1850-52. Immediately to the west, outside the Brandenburg Gate (resembling a Roman triumphal arch), are the palace and park of Sans Souci. The palace, a building of one story, was erected under the direction of Frederick the Great; the grounds are finely laid out, and contain various fountains, etc., and an orangery 330 yards long. In the same neighborhood is the New Palace, a vast brick building exhibiting much gaudy magnificence. A third palace in the environs of the town is called the Marble Palace. Potsdam was an unimportant place till the Great Elector selected it as a place of residence and built the royal palace (1660-71). Pop. (1905) 61,414.

Potstone (pot'stōn; *Lapis ollāris*), a species of talc containing an admixture of chlorite. Its color is green of various shades; it is greasy and soft, but becomes hard on being exposed to the air. It derives its name from its capability of being made into vases, etc., by turning. It was obtained by the ancients from quarries in the island of Siphnos and in Upper Egypt. It is now quarried in the Valais in Switzerland, in Norway, Sweden, Greenland, and the neighborhood of Hudson Bay.

Pott (pot), August Friedrich, a German philologist, born in 1802. He studied at Göttingen, became a teacher in the gymnasium at Celle, and subsequently privat-docent in the University of Berlin. He wrote *Researches in the Etymology of the Indo-Germanic Languages*, etc. He died in 1887.

Potter (pot'ėr), Henry Codman, author and divine, was born at Schenectady, New York, in 1835. He entered the Protestant Episcopal ministry, and became bishop of New York City in 1887. He published numerous works and was an energetic social reformer. In 1900 he visited the Philippines and published his views thereon. He died in 1908.

Potter, John, an English classical scholar and divine, primate of

all England, born in 1674, was the son of a linen-draper of Wakefield. In 1706 he became chaplain to Queen Anne. In 1708 he was appointed regius professor of divinity at Oxford, in 1715 was raised to the see of Oxford, and in 1737 appointed Archbishop of Canterbury. He died in 1747. His works include *Archæologia Græca*, a work on Greek antiquities, *A Discourse on Church Government* (1707), an edition of *Clemens Alexandrinus* (1714), and theological works (Oxford, 1753).

Potter, Paul, a celebrated Dutch painter of animals, born at Enkhuisen in 1625. He received his first instruction in art from his father, Pieter Potter (1587-1655), a painter of some note. He devoted himself specially to the study of animals, producing his first-signed picture, *The Herdsman*, in 1643. His works, specimens of which are in the more important European galleries, are highly esteemed. His coloring is brilliant, and the separate parts are delicately executed, yet without stiffness or mannerism. His pictures are generally of small size, but there is a celebrated one of large size in the museum of The Hague. It represents a man and cattle, with a bull in the foreground, and is known as Paul Potter's bull. He died at Amsterdam in 1654, at the early age of twenty-nine. His engravings are much esteemed, and his paintings command a high price.

Successive Stages of Earthenware Vessel on the Potter's Wheel.

Potter's Clay. See *Clay*.

Pottery (pot'ėr-i), the art of forming vessels or utensils of any sort in clay. This art is of high antiquity, being practiced among various races in prehistoric times. We find mention of earthenware in the Mosaic writings. The Greeks had important potteries at Samos, Athens, and Corinth, and attained great perfection as regards form and ornamentation. Demaratus, a Greek, the father of Tarquinius Priscus, king of Rome, is said to have instructed the Etruscans and Romans in this art. Glazed earthenware was long supposed to be of no older date than the ninth century of our era, and to have originated with the Arabs in Spain; but the discovery of glazed ware in Egypt, of glazed bricks in the ruins of Babylon, of enameled tiles and glazed coffins of earthenware in other ancient cities, proves that this is not the case. The Arabs, however, seem to be entitled to the credit of having introduced the manufacture of glazed ware into modern Europe. The Italians are said to have become acquainted with this kind of ware as it was manufactured in the island of Majorca, and hence they gave it the name of *majolica*. They set up their first manufactory at Faenza in the fifteenth century. In Italy the art was improved, and a new kind of glaze was invented, probably by Luca della Robbia. The French derived their first knowledge of glazed ware from the Italian manufactory at Faenza, and on that account gave it the name of *faïcnce*. About the middle of the sixteenth century the manufactory of Bernard Palissy at Saintes in France became famous on account of the beautiful glaze and rich ornaments by which its products were distinguished. A little later the Dutch began to manufacture at Delft the more solid but less beautiful ware which thence takes its name. The principal improver of the potter's art in Britain was Josiah Wedgwood in the eighteenth century. Porcelain or chinaware first became known in Europe about the end of the sixteenth century through the Dutch, who brought it from the East. See *Faïcnce* and *Chinaware*.

Though the various kinds of pottery and porcelain differ from each other in the details of their manufacture, yet there are certain general principles and processes which are common to them all. The first operations are connected with the preparation of the potter's paste, which consists of two different ingredients, an earthy substance, which is the clay proper; and a siliceous substance, which is necessary to increase the firmness of the ware, and render it less liable to

shrink and crack on exposure to heat. The clay is first finely comminuted, and reduced to the consistency of cream, when it is run off through a set of wire, gauze, or silk sieves into cisterns, where it is diluted with water to a standard density. The other ingredient of the potter's material is usually ground flints, or flint powder, as it is called. The flint nodules are reduced to powder by being heated and then thrown into water to make them brittle. They are then passed through a stamping mill and ground to fine powder; which, treated in much the same way as the clay, is finally passed as a creamy liquor into a separate cistern. These liquors are now mixed in such measure that the dry flint-powder bears to the clay the proportion of one-sixth or one-fifth, or even more, according to the quality of the clay and the practice of the manufacturer. The mixture is then forced into presses, lined with cloth, by means of a force-pump, the cloth retaining the clay and allowing the water to escape. The clay now forms a uniform inelastic mass, which is cut into cubical lumps and transferred to a damp cellar, where it remains until a process of fermentation or disintegration renders it finer in grain and not so apt to crack in the baking. But even after this process the ingredients composing the paste are not intimately enough incorporated together nor sufficiently fine in texture until another operation has been undergone, called *slapping* or *wedging,* which consists in repeatedly breaking the lumps across and striking them together again in another direction, dashing them on a board, etc. This final process of incorporation is now most frequently performed by machinery.

In making earthenware vessels, if they are of a circular form, the first operation after the paste has been made is turning, or what is technically called *throwing* them on the wheel. This is an apparatus resembling an ordinary turning-lathe, except that the surface of the *chuck*, or support for the clay, is horizontal instead of vertical. The chuck is, in fact, a revolving circular table, in the center of which a piece of clay is placed, which the potter begins to shape with his hands. The rotary motion of the table gives the clay a cylindrical form in the hands of the potter, who gradually works it up to the intended shape. It is then detached from the revolving table and dried, after which, if intended for finely-finished ware, it is taken to a lathe and polished. It is at this stage that the handles and other prominent parts are fitted on, which is done by means of a thin paste of clay called *slip*. The articles are now removed to a room in which they are dried more thoroughly at a high temperature. When they have reached what is called the *green* state they are again taken to a lathe and more truly shaped, as well as smoothed and burnished. When the articles are not of a circular form, and accordingly cannot be produced by means of the wheel, they are either pressed or cast in molds of plaster of Paris. In the former case the paste used is of the same consistence as that employed on the wheel; in the latter molds of the same sort are used, but the clay mixture is poured into them in the condition of slip. By the absorption of the water in the parts next the dry mold a crust is formed of greater or less thickness, according to the time that the liquid is allowed to remain. The molds are in two or more pieces, so as to be easily detached from the molded article.

When shaped and dried the articles are ready for the kiln, in which they are exposed to a high temperature until they acquire a sufficient degree of hardness for use. The paste of which the earthenware is composed is thus converted into what is called *bisque* or *biscuit*. While undergoing this process of baking the articles are enclosed in larger vessels of baked fire-clay, called *saggers*, to protect them from the fire and smoke, and to distribute the heat more uniformly. The whole firing lasts from forty to forty-two hours. After the kilns have been allowed to cool very slowly, the articles are taken out, and if they are not to be decorated in color, and sometimes also when they are to be so decorated, they are immersed in a vitrifiable composition called *glaze*, which, after the vessels have been a second time subjected to heat in glazed saggers, is converted into a coating of glass, rendering the vessels impermeable to water.

These processes are all that are necessary to complete a plain earthenware vessel, but very frequently the vessels are adorned with printed or painted decorations executed in colors, such as may be burned into the substance of the article. There are two methods of printing on earthenware: press-printing, which is done on the bisque, and bat-printing, done on the glaze. In both cases an engraving is first executed in copper, and thence transferred, by means of a sheet of paper containing an impression, to the article requiring to be printed; but the processes are slightly different in detail. When the vessel has received its impression it is ready to be fired in the enamel kiln. Painting on earthenware is effected with a brush over the glaze.

All the numerous varieties of earthenware are made in the manner just described, with only slight modifications in the nature of the ingredients of their composition or the processes of manufacture. Stoneware may be formed of the clays which are used for other vessels, with the addition of different sorts of sand, and sometimes of cement. A greater degree of heat is applied than in the case of ordinary earthenware, and when some fluxing substance is added it has the effect of producing that state of semifusion which is the distinguishing quality of stoneware. A kind of semivitrified ware, first made by Wedgwood, takes its name from him. It is made of two different kinds of pastes, both very plastic. This ware is incapable of taking on a superficial glaze; but by a process called *smearing*, which is simply baking at a high heat in saggers coated internally with a glaze, acquires a remarkable luster.

Porcelain or chinaware is formed only from argillaceous minerals of extreme delicacy, united with siliceous earths capable of communicating to them a certain degree of translucency by means of their vitrification. Porcelain is of two kinds, hard and tender. Both consist, like other earthenwares, of two parts — a paste which forms the biscuit, and a glaze. The biscuit of hard porcelain is composed of kaolin or china clay, and of decomposed felspar. The glaze consists of a felspar rock reduced to a fine powder, and mixed with water, so as to form a milky liquid into which the articles are dipped after a preliminary baking. Tender porcelain biscuit is made of a vitreous frit, composed of siliceous sand or ground flints, with other ingredients added, all baked together in a furnace till half-fused, and then reduced to a condition of powder. The glaze of tender porcelain is a specially prepared glass ground fine, and made into a liquid by mixing with water. The processes employed in manufacturing porcelain wares are very much the same as those used for other kinds of earthenware, but requiring more delicacy and care. The biscuit paste even of hard porcelain has so little tenacity compared with that of earthenware that it cannot easily be shaped on the wheel, and is consequently more frequently molded. The paste of tender porcelain is still less tenacious, so that the wheel cannot be used for it at all, and a little mucilage of gum or black soap must be added before it can be worked even in molds. During the baking, too, it becomes so soft that every part of an article must be supported. Tender porcelain receives two coats of glaze.

Metallic oxides incorporated with some fusible flux, such as borax, flint, etc., are used for painting on porcelain. The colors are mixed with essential oils and turpentine, and applied by means of a camel's-hair brush. When the painting is finished the vessels are baked in a peculiar kind of ovens called *muffles*, which are also used for fixing the printed figures on the glaze of stoneware. By the operation of the furnace most of the colors employed in painting porcelain become quite different, and the change which takes place in them is usually through a series of tints, so that the proper tint will not be obtained unless the baking is stopped precisely at the proper time. Sometimes porcelain has designs etched on it by means of fluoric acid. Sculptures also are executed by casting in molds in various kinds of porcelain, called statuary porcelain, Parian, Carrara, etc. The most important seats of the manufacture of earthenware in the United States are at Trenton, New Jersey, and East Liverpool, Ohio.

Pottinger (pot'in-jėr), Eldred, a British officer, famed for his defense of Herat in 1838, was born in Ireland in 1811, and went to Bombay at the age of 17 as artillery cadet. In 1837 he traversed Afghanistan in disguise, and reached Herat after many risks. The city was then held by an Afghan prince, and was besieged by the Persians for nearly a year, when it was relieved by a British diversion in the Persian Gulf. The credit of the defense was given to Pottinger. Major Pottinger took a leading part in the disastrous Afghan war of 1841-42, and as political agent had to sign terms with the rebels, which were afterwards repudiated by Lord Ellenborough. A trial by court-martial only served to show his conduct in brighter colors. He died in 1843 at Hong-Kong.

Pottinger, Sir Henry, Bart., a distinguished soldier and diplomatist, uncle of the above, born in 1789. He went to India as a cadet in 1804, and soon became known for his energy and administrative ability. Rising gradually to the rank of major-general, he was, after the Afghan campaign in 1839, raised to the baronetage as a reward for his services. In 1841 he went as minister-plenipotentiary to China, and contributed much to bring hostilities to a conclusion. He was successively governor and commander-in-chief of Hong-Kong (1843), governor of the Cape of Good Hope (1846), governor and commander-in-chief of Madras (1850-54). He died in 1856.

Pottstown (pots'toun), a borough of Montgomery Co., Pennsylvania, on the Schuylkill River, 40 miles W. N. W. of Philadelphia, is a thriving manufacturing town, with extensive iron and other industries, including numerous rolling mills, nailworks, steel mills, hosiery and silk factories, etc. Pop. 15,599.

Pottsville (pots'vil), a city of Pennsylvania, capital of Schuylkill Co., on the Schuylkill River, 93 miles N. W. of Philadelphia. It is in the center of the great anthracite coal-field, with extensive blast-furnaces, forges, foundries, rolling mills, steam-engine and machine factories, also manufactures of brass, hosiery, velvets, silk, flour, lumber, etc. The annual product of the neighboring coal mines is several million tons. It is on several railroad lines and is an important shipping point. Pop. 20,236.

Pouched Rat. See *Gopher*.

Poudrette (pö-dret'), the name given to a powdery manure obtained from ordure. It takes a long time to prepare, is pulverulent, of a brown color, and almost inodorous. It contains on an average about 25 per cent. of water, and 25 per cent. of fixed salts. Largely made in France, it is in demand in all quarters, being found particularly useful for gardens. Its efficacy, weight for weight, is five times that of cow dung.

Poughkeepsie (pō-kip'si), a city in the state of New York, capital of Dutchess County, situated on the east bank of the Hudson River, 74 miles north of New York City and 70 miles south of Albany. It is built partly on a slope, partly on a plateau, about 200 feet above the river, and is prettily situated. It is distinguished for its educational institutions and is known as the 'City of Schools.' These include Vassar College for women, one of the chief institutions of the kind in America. Its industries include blast furnaces, and the manufacture of farming implements, milk separators, horseshoes, machinery and many other articles. Pop. 27,936.

Poulpe (pölp). See *Octopus*.

Poultice (pōl'tis), in medicine, a soft, moist application applied externally to some part of the body either hot or cold, but generally the former. The simple poultice is made with linseed meal and boiling water, spread out with uniform thickness on a cloth or rag, and is used where it is desired to hasten the progress of inflammation. Its moisture causes relaxation of the skin, and thereby lessens the discomfort or pain. It acts also as a counter-irritant, producing a redness and congestion of the skin. *Disinfecting poultices* are made with charcoal, mixed with linseed-meal and bread. The *sedative poultice*, made with beer, yeast, flour, and hot water, is generally used to relieve pain in cases of cancer. The best-known poultice, however, is the *counter-irritant*, commonly called a mustard-plaster. This may be made by mixing linseed-meal with water, and adding mustard. It produces a rapid but mild counter-irritation, indicated by a redness of the skin, and is very useful in cases of bronchitis, lumbago, and similar affections.

Poultry (pōl'tri), a general name for all birds bred for the table or kept for their eggs. The birds most commonly included under this designation are the common fowl, the pea-fowl, the guinea-fowl, the turkey, goose, and duck. There is this great difference between the varieties of the domestic fowl, that some are disposed by constitution to continue laying throughout the whole season without sitting; while others after having laid from twelve to fifteen eggs sit obstinately, and cease to lay. Among the breeds most in favor are those known as Dorking, Game, Hamburg, Cochin, Brahma, Polish, Spanish, etc. Poultry, if they are to be kept for profit, should have a spacious house, with a yard and shed attached. The house should be moderately warm, well lighted, and perfectly dry. Either boxes must be formed along the walls to serve as nests for the fowls, or shelves on which baskets for the nests may be put. These boxes and shelves may be formed of wood; but they are better when constructed of smoothly polished flagstones or slates. Turkeys and geese had better not occupy at night the same house with hens and ducks, as they are apt to be mischievous, especially to sitting birds. A small pond is sufficient for the thrifty rearing of both geese and ducks. In many cases fowls are bred for exhibition and to take prizes, this and the consequent value of the eggs being often a considerable source of profit. Hatching by artificial means has long been practiced in Egypt, and artificial incubators are extensively used throughout the United States. There is an immense demand alike for the common fowl for table purposes, and for its eggs, which are indispensable in cookery, and enormous numbers are annually produced and consumed in all regions of the earth.

Pounce (pouns; a corruption of *pumice*), a fine powder formerly used to prevent ink from spreading on paper, now superseded by blotting-paper. The term is also applied to charcoal dust

or some other powder used in embroidery or engraving, to trace a design or pattern by being sifted through pinholes in the paper.

Pound, in English law, an enclosed place for keeping cattle which have strayed on another man's ground, until they are redeemed. A pound may belong to a parish or village or to a manor.

Pound, an English weight of two different denominations, *avoirdupois* and *troy*. The pound *troy* contains 5760 grains, and is divided into 12 ounces; the pound *avoirdupois*, contains 7000 grains, and is divided into 16 ounces. The *pound*, or *pound sterling*, the highest monetary denomination used in British money accounts, and equal to 20 shillings, was so-called from its originally being equal to a quantity of silver weighing one pound. The pound is used strictly as a money of account, the coin representing it being the sovereign. See *Money*.

Poundage, a rate of so much per *pound*, sometimes a percentage deducted from wages paid in advance. Also, a tax formerly levied on merchandise by weight.

Poushkin. See *Pushkin*.

Poussin (pö-saṇ), GASPAR, a French landscape painter, born in Rome in 1613. His real name was Dughet; but having been placed under the instructions of the celebrated Nicolas Poussin, who had married his sister, he assumed the surname of his master. He lived mostly in Rome or its neighborhood, and had extraordinary facility of execution, so that his works are very numerous, specimens being found in all the chief collections in Europe. His paintings are distinguished by grandeur and rather somber characteristics, and storms or high winds were subjects in which he excelled, though he was also highly successful with morning and evening effects. The pictures of his maturer period owe much to the influence of Claude. Many of his figures are said to have been supplied by Nicolas Poussin. He died about 1675.

Poussin, NICOLAS, a distinguished French historical and landscape painter, born at Andelys, in Normandy, in 1594. He first studied in his native place, and then at Paris, under masters of little merit; but he made astonishing progress. He had already acquired considerable reputation when, in 1624, he went to Italy for the purpose of improving himself in his art; there he lodged with Du Quesnoy, the sculptor, and attended the school of Domenichino. At Rome he fell into great want, but was assisted by a Frenchman, Jacques Dughet, and by him tended through an illness brought on by overwork. In 1630 Poussin married the daughter of his benefactor. About this time his affairs began to improve. He found liberal patrons in Cardinal Barberini and in the Cavaliere Cassiano del Pozzo, for whom he painted the celebrated *Seven Sacraments*, now at Belvoir Castle. He was also invited to paint the great gallery of the Louvre; and his successes gained him the position of first painter to Louis XIII, with a pension of 3000 livres. From 1640 to 1642 he resided in Paris; but the rivalry of French painters and the want of appreciation of his works evinced by the Parisians induced him to return to Rome, where he lived until his death in 1665. He modeled statues and reliefs with great skill, and might have become an eminent sculptor. Historical and landscape paintings, however, were the chief subjects of his genius; in these his style is grand and heroic, and his invention fertile. He has been called the Raphael of France. Among his more celebrated works are the *Seven Sacraments*, the *Death of Germanicus*, the *Capture of Jerusalem*, the *Plague of the Philistines*, *Abraham's Servant and Rebecca*, the *Adulteress*, the *Infant Moses*, *Moses and the Daughters of Jethro at the Well*, *Moses bringing Water from the Rock*, the *Worship of the Golden Calf*, *John Baptizing in the Wilderness*, etc., and many fine landscapes.

Pout. See *Bib*.

Pouter (pou'tėr), a variety of fancy pigeon, the chief character of which is its very projecting breast.

Povoa de Varzim (pō-vō'a dā vārzeṇ'), a seaport and bathing place of Portugal, about 16 miles northwest of Oporto. Pop. 12,623.

Powan (pou'an; *Coregŏnus clupeoides*), a fish inhabiting Loch Lomond, in Scotland, and also known as the fresh-water herring.

Powderly (pou'der-li), TERENCE VINCENT, was born at Carbondale, Pennsylvania, in 1849, became a machinist, and was master workman of the Knights of Labor 1879-93. He was elected mayor of Scranton for three terms, and was made commissioner-general of immigration in 1897. He was admitted to the bar in 1894, and to the bar of the U. S. Supreme Court in 1901. In 1906 he was sent abroad to study causes of immigration, and in 1907 was made chief of the Division of Information in the Bureau of Immigration. He wrote *Thirty*

Years of Labor, and *History of Labor Day*.

Powell (pou'el), JOHN WESLEY, geologist, was born in Mount Morris, New York, in 1834. In the Civil war he rose to be lieutenant-colonel, losing an arm at Shiloh. In 1867 and years following, under direction of Smithsonian Institution and Department of the Interior, he conducted the geographical and geological survey of the Rocky Mountain region, and was the first to make the perilous journey down the Colorado River, and through its cañon. His *Contributions to North Ameriean Ethnology* are embraced in 3 vols. In 1881 he was appointed Director of the United States Geological Survey. His publications include many scientific papers and addresses, and numerous government volumes. He served as President of the Anthropological Society of Washington and of the American Association for Advancement of Science. He died in 1902.

Power of Attorney, in law, is a deed or written instrument whereby one person is authorized to act for another as his agent or attorney, either generally or in a special transaction.

Powers (pow'ers), HIRAM, sculptor, the son of a farmer, was born at Woodstock, Vermont, in 1805. He early displayed great ingenuity in mechanical matters, and became somewhat noteworthy on this account while acting as a shopman and assistant to a clockmaker of Cincinnati. He next obtained employment in a museum in that city. At this period he formed the acquaintance of a German sculptor, and having been taught modeling by him, determined to become himself a sculptor. In 1835 he went to Washington, and had sufficient success there to enable him to proceed to Italy. He now settled in Florence, where he resided until his death in 1873. He is distinguished in portraiture, and produced busts of many of the most noted American statesmen. His most famous ideal works are the statue of *Eve*, the *Greek Slave*, and the *Fisher Boy*.

Powhatan (pow'ha-tan), an Indian chief of Virginia, born about 1550; was the father of Pocahontas (which see). He died in 1618. He was friendly to the settlers, but after his death the confederacy of tribes of which he was chief became hostile, and in the conflicts that ensued they were nearly all destroyed.

Powers, THE GREAT, a term of modern diplomacy, by which have long been meant Britain, France, Austria, Germany, Italy, and Russia, and to which must now be added the United States and Japan.

Poynings' Law (poi-nings'), or the statute of Drogheda, an act of the Irish Parliament, passed in 1495, whereby all general statutes before that time made in England were declared of force in Ireland. It was so named from Sir Edward Poynings, deputy of Ireland under Henry VII in 1494, when he suppressed the revolt of Perkin Warbeck. See *Ireland* (*History*).

Poynter (poin'tẽr), SIR EDWARD JOHN, son of Ambrose Poynter, an architect, was born in Paris in 1836; received his art training at the schools of the Royal Academy and under Gleyre in Paris; gained a reputation by his *Israel in Egypt*, exhibited in 1867, and *The Catapult* (1868); painted the cartoons for the mosaic of *St. George* in the Westminster Palace (1869). He produced various other notable paintings. He was elected an associate in 1869 and a Royal Academician in 1876, was the first Slade professor of art at University College, London, and was director for art at South Kensington for some years. He was made President of the Royal Academy in 1896 and knighted in 1902.

Pozoblanco (pō-thō-blăn'kō), a town in Spain, in the prov. of and 36 miles north of the city of Cordova. Its inhabitants are chiefly employed in agriculture and as muleteers. Pop. 12,792.

Pozzolana, or POZZUOLANA (pot-sö-u-lå'na), a sort of mortar produced in Italy and formed of volcanic ashes. When mixed with a small portion of lime it quickly hardens even under water. This singular property renders it very useful as a cement in the erection of moles and other buildings in maritime situations. It is much used in Italy as a substitute for mortar, and has received its name from Pozzuoli, the port from which it is shipped.

Pozzuoli (pot-sö-ē'lē), the ancient *Puteoli*, a city and seaport of Southern Italy, 6 miles W.S.W. of Naples, on the shore of the Bay of Baiæ (Golfo di Possuoli), the northwestern portion of the Bay of Naples. (See *Naples*.) The coast forms a natural harbor, which is well sheltered; and a considerable trade and an active fishing is carried on. Pozzuoli is a city of great historic interest. It was founded by the Greeks about 520 B.C., and became under Rome a great center of commerce. St. Paul landed here in the course of his journey to Rome. Pozzuoli was destroyed by the Goths more than once, rebuilt by the Byzantine Greeks, and finally devas-

tated by earthquakes and volcanic eruptions. It abounds in ancient ruins. The cathedral stands on the site of a temple of Augustus, and in one of the lateral walls six Corinthian columns of the old temple are preserved. A ruined Temple of Serapis also remains, enclosed by forty-eight marble and granite columns. On an eminence behind the town stands the ruined amphitheater, resting on three series of arches. In the neighborhood are Lake Avernus, the Grotto of the Sibyl, the baths of Nero, the ruins of Baiæ and Cumæ, etc. Recently Pozzuoli has been considerably altered by the establishment of Armstrong, Mitchell, & Co.'s works for supplying guns, armor-plates, and machinery to the Italian government. Pop. (1906) 17,017.

Practice (prak'tis), in arithmetic, a rule for expeditiously solving questions in proportion, or rather, for abridging the operation of multiplying quantities expressed in different denominations, as when it is required to find the value of a number of articles at so many pounds, shillings, and pence each.

Pradier (prȧ-di-ā), JACQUES, an eminent sculptor, born at Geneva in 1792. Having gone to Paris in 1809, and studied art in 1813, he gained the prize of the Academy for a bas-relief of *Philoctetes and Ulysses*. This work procured him admission into the French Academy at Rame. From 1823 he worked constantly at Paris, where his popularity was very great and where he was admitted to the Institute in 1827. His works are of various kinds: religious, monumental, but mainly classical. In execution he ranks as a sculptor of the first class, but his invention and conception are defective, and there is, according to some critics, a decided meretriciousness in his style. He died in 1844. His works comprise: *Centaur and Bacchante*, *Psyche*, *Venus*, *Phryne*, *The Three Graces*, twelve colossal *Victories* on the monument of Napoleon I in the Hôtel des Invalides, statue of *Rousseau* at Geneva, etc.

Praed (prād), WINTHROP MACKWORTH, a poet, born in London, England, in 1802. He was educated at Eton, where in 1820 he became one of the principal contributors to a magazine published there called *The Etonian*. From Eton he went to Trinity College, Cambridge, where he obtained for two years in succession the chancellor's prize for an English poem. At this time, like Macaulay, he contributed both in prose and verse to *Knight's Quarterly Magazine*. In 1829 he was called to the bar, and in 1830 and 1831 was returned by St. Germans to Parliament, where he took a prominent part in opposing the passing of the reform bill. He died in 1839. His poems are mostly of a light and elegant character, belonging to the class known as *vers de société*, but they also comprise others in a more serious vein.

Præfect (prē'fect; *præfectus*), the title of various functionaries of ancient Rome. Of these, the most important was the *præfectus urbi* or *urbis* (prefect of the city). During the kingly period and the early republic the *præfectus urbis* had the right to exercise all the powers of the king or consuls in their absence. After the foundation of the prætorship (see *Prætor*) this office lost its dignity and privileges; but under the empire it was revived as that of chief permanent magistrate of the city, with important military functions. The *præfectus prætorio*, an officer under the empire, was general of the imperial life guards. His position was one of great power, for the troops under his command frequently decided the succession of the imperial throne. (See *Prætorians.*) Many other Roman functionaries bore the title of præfect, such as the *præfectus aquarum*, who had charge of the water supply of the city; the *præfectus ærarii*, who managed the public treasury, etc.

Præmunire (prē-mū-nī're), in English law, a name given to a kind of offense of the nature of a contempt against the monarch and the government. The term is derived from the opening words of the writ preparatory to the prosecution of the offense — *præmonere* or *præmunire facias A. B.* (Cause A. B. to be forewarned that he appear before us, etc.). The punishment is forfeiture and imprisonment during the sovereign's pleasure. Many of the statutes are now repealed, and prosecutions upon præmunire are unheard of in our times; the last took place during the reign of Charles II.

Præneste (prē-nes'te), the ancient name of Palestrina (which see).

Prætor (prē'tor), an important official in the ancient Roman state. Up to 367 B.C. the title was merely an adjunct to that of consul; but when at that date the consulship was thrown open to the plebeians, the judicial functions of the consul were separated from his other duties and given to a new patrician magistrate, who was entitled the prætor. In 337, after a struggle, the plebeians were also admitted to this office. In 246 B.C. another magistracy, that of *prætor peregrinus*, was instituted for the purpose of settling disputes between foreigners and

between foreigners and citizens; and in distinction from him who filled this office the other functionary was termed *prætor urbānus*. After election the two prætors determined their offices by lot. The *prætor urbānus* was the first in position, and was the chief magistrate for the administration of justice. About B.C. 227 the number of prætors was increased to four; afterwards to six and eight; and under the empire the number varied from twelve to eighteen. After completing his year of office the prætor was often sent as *proprætor* to govern a province. See *Proconsul.*

Prætorians (prē-tor'i-anz), the bodyguard of the Roman emperors, first established as a standing body by Augustus. Under him only a small number of them were stationed in Rome, the rest being in the adjacent towns. Tiberius assembled the whole at Rome, where they were used to quell any sudden popular disturbance. The number of cohorts was raised by Vitellius from nine to sixteen, and under the later emperors they became powerful enough to decide the succession to the throne. They were reorganized and their powers curtailed by Septimius Severus and by Diocletian, and were finally disbanded by Constantine the Great, 312 A.D.

Pragmatic Sanction, a public and solemn decree pronounced by the head of a legislature. In European history several important treaties are called pragmatic sanctions, but the one best known by this name is the instrument by which the German Emperor Charles VI, being without male issue, endeavored to secure the succession to Maria Theresa.

Pragmatism, a name given to a logical development of the scientific method as applied to metaphysical problems, or to the mental attitude that refuses to accept any theory except in as far as it explains facts and is translatable into action. The best authorities on the subject are John Dewey, *Studies in Logical Theory* (1903), and William James, *Pragmatism* (1907).

Prague (prāg; Bohemian, *Praha*, German, *Prag*), the capital of Bohemia, a prosperous and well-built city near the center of the kingdom, on both sides of the Moldau, here crossed by seven bridges; 153 miles northwest of Vienna and 75 miles southeast of Dresden, with both of which it is connected by railway. Its site is a regular basin, cut in two by the river, from the banks of which the houses rise on both sides till they are terminated and enclosed by hills of considerable height. When viewed from the Karlsbrücke, or old bridge, the city presents a most imposing appearance. It was formerly enclosed by a wall and fosse, but these defenses have been demolished. Among the public buildings of Prague are the old castle, or palace of the Bohemian kings; the Roman Catholic cathedral, a Gothic structure (founded 1344), somewhat shapeless from having been only partly finished, though an effort is now being made to complete it; the Jesuit college, called the Clementinum, consisting of churches, chapels, and other buildings, and containing the university library; the Carolinum, or college of law and medicine; the town-hall; the Teynkirche or old church of the Hussites, interesting as containing statues and other works of art and the burial place of the astronomer Tycho Brahe; the palace of Wallenstein, originally a magnificent structure, but now much dilapidated, etc. The manufactures of Prague are of great variety, including gold and silver embroidery, silk, woolen, cotton, and linen goods, porcelain, and jewelry. The suburbs of Karolinenthal and Smichow, the former with 25,000, the latter with 50,000 inhabitants, are quite modern, and are busy industrial centers. From its position on the river Moldau, Prague has free communication with the Elbe, which gives it great facilities for transport in addition to its railway connections. Prague is one of the oldest towns in the kingdom, dating from the eighth century. Its university was founded in 1348, and had at one time about 10,000 students. Recently it was divided into two universities, a German and a Czech or Bohemian, having together more than 3500 students. The city was long greatly disturbed by the struggles between the Roman Catholics and the Hussites. It suffered severely also in the Thirty Years' war. In 1631 the city was captured by the Saxons, who were driven out a few months later by Wallenstein. Since that date it has passed through many vicissitudes. In 1742 it was taken by the French and Bavarians, and two years later capitulated to Frederick the Great. After the Seven Years' war the city made rapid strides. During the Austro-Prussian war in 1866 Prague was occupied by the Prussians, and here the treaty of peace was signed on the 23d of August. Pop. (1906) 460,849, of whom nearly three-sevenths are Germans, and four-sevenths Bohemians.

Prahran (prå-ran'), a town in Victoria, Australia, a S.E. suburb of Melbourne. Pop. 41,161. See *Melbourne.*

Prairial. See *Calendar.*

Prairie (prā'ri; French 'meadow'), the name given in the United States to the vast natural meadows or plains of the Mississippi valley, especially lying between it and the Rocky Mountains, and extending northwards into Central Canada. Throughout this immense territory the differences of level are sufficient to produce a steady flow of the rivers, but not so great as to obstruct their navigation, thus securing a unique system of easy intercommunication between all sections of the interior. There is a great sameness in the features of the topography, the vegetable productions, the soil, and geological features. Some of the prairies that have a peculiarly undulating surface are known as *rolling prairies.* The prairies were formerly treeless, except along the streams, and the annual burning of their dried grass by the Indians is supposed to have given rise to the autumnal mistiness visible in the 'Indian Summer.' They have now much more woodland. Vast herds of buffaloes used to roam over the prairies, but these have been destroyed. Immense tracts are now cultivated, and produce large crops of wheat and maize with little outlay of labor on the part of the farmer, the soil being deep and rich. They constitute, in fact, the great grain-raising region of the United States.

Prairie-dog, or PRAIRIE MARMOT, a small rodent animal, the wistonwish (*Cynomys ludovicianus*), allied to the marmot as well as to the squirrel, and found on the North American prairies west of the Mississippi and east of the Rocky Mountains. These animals live gregariously in burrows, and are characterized by a sharp bark, like that of a small dog, whence their popular name. They are about 1 foot in length exclusive of the tail, which is rather short. Their burrows are quite close together, and have a mound of excavated earth near the entrance, on which the little animals are wont to sit and look around them. These communities are termed 'villages.' A second species, *C. columbiānus*, inhabits the region west of the Rockies. The prairie-dog is not to be confounded with the prairie-squirrel, to which it is allied.

Prairie-hen, the popular name of the pinnated grouse of the United States (*Tetrao cupīdo*). The neck of the male is furnished with neck-tufts of eighteen feathers, and is remarkable also for two loose, pendulous, wrinkled skins, which somewhat resemble an orange on inflation. The prairie-hen is much prized for the table.

Prairie-squirrel, or GOPHER, a name for several animals of North America, of the genus *Spermophĭlus*, found in the prairies in great numbers. They live in burrows, and not on trees, and much resemble the prairie-dog or marmot. They have cheek-pouches, in which their food is carried. This consists of prairie plants with their roots and seeds.

Prairie-wolf, or COYOTE (*Canis latrans*), the small wolf which is found on the prairies in North America, believed by many to be a mere variety of the European wolf. It is a cowardly animal, and only dangerous to man when in packs and pressed by hunger.

Prâkrit (prå'krit), the name of certain Hindu dialects, which acquired greater prominence as the older Sanskrit passed gradually out of use. The modern tongues of India have sprung from the Prâkrit just as the Romance languages have sprung from the old Italian dialects, and not from the literary Latin.

Prase (prāz), a dark leek-green variety of quartz, the color of which is due to an admixture of hornblende.

Pratique (pra-tēk'), a term used to signify a kind of limited quarantine, which the captain of a vessel is held to have performed when he has convinced the authorities of the port that his ship is free from infectious diseases; more generally, the license to trade after having performed quarantine.

Prato (prä'tō), a town of Italy, in Tuscany, 11 miles northwest of Florence, in a fertile plain, on the right bank of the Bisenzio. It dates from the twelfth century, is surrounded by ancient walls, and is a well-built, cheerful-looking place. The cathedral is very beautiful; it was begun by Nicolo Pisano, and completed after his designs in 1450 with a façade furnishing a beautiful specimen of Italian Gothic. Prato has manufactures of woolen, cotton, silk, etc. Pop. (1906) 20,199.

Pratt, CHARLES, philanthropist, born at Wintertown, Massachusetts, in 1820; died in 1891. He became wealthy through the introduction and sale of astral oil, and in 1887 founded the Pratt Institute in Brooklyn, to which he added an immense tenement house and left it by will an endowment of $2,000,000.

Pratt, ENOCH, philanthropist, born at North Middleboro, Massachu-

setts, in 1808; died in 1896. He grew wealthy in the iron business in Baltimore and founded various benevolent institutions, including the free public library of Baltimore, to which he left an endowment of over $1,000,000.

Prawn (prạn; *Palæmon*), a genus of crustaceans, order Decapoda, section Macrura ('long-tailed'). The common prawn (*Palæmon serratus*) is the most familiar species, and resembles the shrimp. It attains an average length of from 3 to 5 inches. The tail is broad and flat, and its terminal plates are fringed with long hairs. The color is light gray spotted with purple, which is brightest in the antennæ. It is well known and esteemed as an agreeable article of food.

Praxiteles (praks-it'e-lēz), one of the greatest sculptors of ancient Greece, a citizen, if not a native, of Athens, flourished about 364 B.C. He and his contemporary Scopas stand at the head of the later Attic school, so called in contradistinction to the earlier Attic school of Phidias. Without attempting to rival Phidias in grandeur, Praxiteles chose subjects which demanded a display of the human form, especially in the female figure. The finest is said to have been the *Cnidian Aphroditē* (Venus), whom he was the first to represent naked. The group of *Niobe and her Children*, now in existence at Florence, is by some attributed to Praxiteles and by others to Scopas. His two statues of *Eros* (Cupid) were also celebrated. One of them, placed in the Temple of Eros at Thespia, and the statue of a satyr were considered by Praxiteles, according to Pausanias, as his finest works. An excellent copy of the latter still exists. Among his works were also statues of *Apollo*, *Dionysos*, *Demeter*, etc., in marble and in bronze, which served as models to succeeding artists. Quite recently, a marble statue of *Hermēs* by Praxiteles has been discovered at Olympia.

Prayer (prār), a petition offered to a divinity. The Scriptures tacitly assume that prayer was offered to God from the beginning of the world; and although we read that 'men began to call upon the name of the Lord' after Seth was born, we are forbidden by all commentators to connect this statement with the origin of prayer. It is not, however, until the time of Abraham that prayer comes first distinctly into notice. As the altar appears to have been the special place for prayer in the patriarchal age, so was the tabernacle under the Mosaic covenant until the temple, 'the house of prayer,' was built. From the time of the dedication of Solomon's temple the Jews appear to have gone there to pray, and to have turned their faces towards it if they were prevented from going there; and this custom prevails among the Jews at the present time, as does the similar custom among the Mohammedans, who turn their faces towards the sacred Kaaba at Mecca. When we come to New Testament times we meet with synagogues established as places for the public worship of God, and for reading his word. Christ taught that prayer should be offered to God in his name in order to ensure an answer. Henceforward Christ became to the Christian what the temple was to the Jew. The posture of the body in prayer is left undecided in Scripture, and although Christ gave his disciples a form of prayer of the most universal application, it does not follow that men may not pray according as each experiences special wants.

Prayer for the dead is a practice rejected by Protestants as having no scriptural warrant, but which prevails in the Roman Catholic, and the Greek and other Eastern churches. The custom seems to have existed in most ancient religions. The doctrine and practice came to the Christian Church through the Jews (2 Maccabees, xii, 43, 45). The first of the Christian fathers who mentions prayer for the dead is Tertullian; but he speaks of the usage as long established in the church; such prayers are frequently alluded to by St. John Chrysostom, Cyril of Jerusalem, and St. Augustine. In the burial service of the first Book of Common Prayer of the English Church some prayers for the dead appeared, but they were deleted from the second book, and are not found in the subsequent revisions.

Praying Wheel, an apparatus used by the Buddhists of Tibet and other parts of the East, as a mechanical aid to prayer. The prayers are inscribed on a cylinder or wheel, fixed on an axle, every turn of which counts as a prayer uttered. To facilitate this holy duty they are often set in the bed of a running stream to be turned incessantly by the water, or may be placed in such a way as to be turned by the current of cool air flowing into a tent.

Pre-Adamites, traditional inhabitants of the earth prior to the creation of Adam. Ancient legends or traditions of the East speak of nations and empires existing before Adam's creation, and of a line of kings who ruled over them. In modern times

the subject was taken up by Isaac de la Peyrère, who, in a work published in 1655, maintained that the Jews were the descendants of Adam, and the Gentiles those of a long anterior creation, founding his opinions on Romans, v, 12-14.

Prebend (preb'end), a yearly stipend paid from the funds of an ecclesiastical establishment, as of a cathedral or collegiate church. *Prebendary* is the person who has a prebend. A *simple* prebend is restricted to revenue only; a *dignitary* prebend is one which has a jurisdiction annexed.

Precedence (prē-sē'dens), the order in which men and women follow each other according to rank or dignity in a state procession or on other public occasions. In England the order of precedence depends partly on statutes, and partly on ancient usage and established custom. Questions arising on matters of precedence depending on usage are hardly considered as definitely settled, and are in a great measure left to the discretion of the officers of arms. The sovereign, of course, is always first in order of precedence, after whom in descending order follow the Prince of Wales, sons of the sovereign, grandsons of the sovereign, brothers of the sovereign, uncles of the sovereign, the sovereign's brothers' or sisters' sons, the Archbishop of Canterbury, the Lord High Chancellor, and so on through the high state dignitaries, the various ranks of the peerage, etc. The order of precedence among women follows the same rules as that among the men. By the acts of Union of Scotland and Ireland the precedence in any given degree of the peerage has been established as follows: — 1. Peers of England; 2. Peers of Scotland; 3. Peers of Great Britain; 4. Peers of Ireland; 5. Peers of the United Kingdom and Peers of Ireland created subsequent to the Union. Rules of precedence are also strictly observed in some of the European states, but are of minor importance in the United States.

Precedent (pres'e-dent), in law, a judicial decision which serves as a rule for future determinations in similar cases. Precedents, strictly speaking, are binding on tribunals only when they are actual decisions of the point in question; what is termed an extrajudicial opinion or *obiter dictum* — the opinion of a judge pronounced where it was not called for to decide the issue — can have authority only from the character of the judge, and not as a precedent. Precedents are now of as much authority in courts of equity as in those of common law.

Precentor (prē-sen'tur), in old religious foundations, an important official in a chapter, whether cathedral or collegiate, who led the singing. He ranked generally, although not universally, next to the dean; but in modern cathedral foundations he is usually a minor canon, and in consequence has lost much of his prestige. He is still, however, everywhere the conductor of the choral service, and superintendent of the choir.

Preceptory (prē-sep'tu-ri), in mediæval history, a religious house of the Knights Templars, subordinate to the temple or principal house of the order in London. It was under the government of one of the more eminent knights appointed by the grand-master.

Precession of the Equinox, a slow motion of the line of intersection of the celestial equator or equinoctial and the ecliptic, which causes the positions occupied by the sun at the equinox (the equinoctial points, which see) to move backward or westward at the mean rate of 50.25″ per year. This motion of the equinox along the ecliptic carries it, with reference to the diurnal motion, continually in advance upon the stars; the place of the equinox among the stars, with reference to the diurnal motion, thus precedes at every subsequent moment that which it previously held, hence the name. This sweeping round in the heavens of the equinoctial line indicates a motion of the axis of rotation of the earth, such that it describes circles round the poles of the ecliptic in 25,791 years. Nutation (L. *nutatio*, a nodding) is a similar, but much smaller gyratory motion of the earth's axis, whose period is about nineteen years. From these two causes in combination the axis follows a sinuous path, instead of a circle, about the pole of the ecliptic. Nutation causes the equinoctial points to be alternately in advance of and behind their mean place due to precession by 6.87″. At present the vernal equinoctial point is in the zodiacal sign Pisces, and it is moving towards the sign Aquarius.

Precious Metals, a name commonly applied to gold and silver in contradistinction to such ordinary and abundant metals as iron, copper, lead.

Precious Stones. See *Gems*.

Precipitate (pre-sip'i-tāt), in chemistry, a solid body produced by the mutual action of two or more liquids mixed together, one or other of them holding some substance in solu-

tion. The term is generally applied when the solid appears in a flocculent or pulverulent form. Substances that settle or sink to the bottom like earthly matters in water are called sediments, the operating cause being mechanical, not chemical. Red oxide or peroxide of mercury is often called *red precipitate.*

Precognition (prē-kog-nish'un), in Scotch law, the examination of a witness at some time previous to his appearance in court. Precognitions may be taken in civil or criminal cases, and may be taken by the agents or counsel for any of the parties. In criminal trials the precognitions for the crown are generally taken by the procurator-fiscal and the signature of the witness is affixed; but those acting for the defense may take precognition from the crown witnesses also if they please. Precognitions are rarely taken in presence of a magistrate, or on oath.

Predestination (prē-des-ti-nā'shun), in theology, the term used to denote the decree of God, whereby the elect are foreordained to salvation. The theory of predestination represents God's absolute will as determining the eternal destiny of man, not according to the foreknown character of those whose fate is so determined, but according to God's own choice. This doctrine has been the occasion of many disputes and controversies in the church in all ages. On the one side, it has been observed that the doctrine of predestination destroys moral distinction, introduces fatalism, and renders all our efforts useless. On the other side, it is contended that if God's knowledge is infinite he must have known everything from eternity; and that the permission of evil under such circumstances is indistinguishable from a plan or decree under which it is foreordained. The first great champions of these opposite views were Pelagius and Augustine. The former held that there was a possibility of good in man's nature, and that the choice of salvation lay in man's will. Augustine maintained that apart from divine grace there is no possibility of good in human nature, and that since the fall man's will has no power of choice. Predestination forms one of the peculiar characteristics of the Calvinistic theology; the question is left an open one by the Anglican Church, and also by the Roman Catholic Church since the Reformation.

Predicables (pred'i-ka-blz), in logic, are terms affirmable, as predicates, of other terms. The predicables are said to be five: genus, species, difference, property, and accident. The first two name the higher and lower classes of the things classified: a genus includes more than one species. The other three express the attributes on which the classification is founded.

Predicament. See *Category.*

Predicate, in logic, what is affirmed or denied of the subject.

Preëxistence, Doctrine of, the doctrine sometimes maintained that the soul of every man has an existence previous to that of his body. This opinion has for ages been prevalent in Hindustan, and was held by several Greek philosophers, more especially by the Pythagoreans, Empedocles, and also apparently by Plato. A similar doctrine has found some countenance in Christian times as an explanation of the union of soul and body. In favor of this theory appeal is made to these peculiar sensations which are sometimes raised by sights or sounds, which we feel conscious of having had a former familiarity with, though reason would persuade us we had seen them for the first time. The doctrine is supported by some modern German philosophers, particularly the younger Fichte, and is maintained by the modern Theosophical Society, which now has a considerable membership in Europe and the United States.

Préfet (prā-fā; L. *præfectus*), the title of an important political functionary in France, whose office was created in 1800 at the instance of Napoleon. There is a préfet at the head of each department, who is entrusted with the whole organization and management of the police establishments; but not with the punishment of police offenses. Within this sphere of action the préfets are unchecked; the sous-préfets, who are appointed by them, and who stand at the head of the districts, are entirely subject to their commands; and the authorities of the communes, as well as the justices of the peace, can set no limits to their activity. In time of tumult they can call out the military, or provisionally declare a state of siege. The council of the préfecture is a court in which are settled all disputes respecting the taxation of individuals, engagements with the state for building, the indemnification of those who have had to give up anything to the public, etc. Of this court the préfet is president, and in it he has a casting vote. The appeals against its decisions lie to the council of state.

Pregnancy (preg'nan-si), the state of a female who is with

child. It lasts in the human subject from 274 to 280 days; that is to say, that time should elapse from the moment of conception to the time of birth. Among the earliest signs of pregnancy are the stoppage of the monthly discharge, and sickness, usually felt in the early part of the day, and thus called 'morning sickness.' The latter usually begins about the fourth or fifth week, and may last all the time, but often diminishes in course of the fourth month. Changes in the breast are evident during the second month, the nipple becoming more prominent, and the dark circle round it being deeper in tint by the ninth week, little elevated points in it being more marked. Towards the fourth month enlargement of the belly becomes noticeable, and continues to increase regularly till delivery takes place. About the sixteenth or seventeenth week quickening occurs; that is, the mother becomes aware of movements of the child. None of these signs are, however, absolutely conclusive, as various conditions may give rise to similar signs or signs resembling them. The only conclusive evidence is the detection of the sounds of the child's heart, heard by applying the ear to the belly of the mother, midway between the navel and the line of the groins, a little to the right or left of the middle line. They may be detected about the eighteenth week. During pregnancy women should take regular meals of plain, nourishing food, avoiding rich and highly-seasoned dishes, and should restrain unwholesome cravings, which sometimes exist. Gentle but regular and moderate exercise should be engaged in, all undue exertion, effort, and fatigue being avoided. Clothing should be warm, woolen next the skin, and *nowhere tight*. Prudence in baths must be exercised, too hot or too cold water being avoided, and the bowels must be kept well regulated, only the mildest medicine being used. Above all, a calm and equable frame of mind should be cultivated, and there should be no hesitation in asking advice of the doctor.

Prejevalski. See *Przhevalski.*

Prelate (prel'at), in church law, one of those spiritual dignitaries who exercise jurisdiction in their own name. These were originally only the bishops, archbishops, patriarchs, and the pope. The cardinals and legates, abbots and priors, also obtained certain privileges of jurisdiction by grant or prescription. The term is now commonly used merely to signify one of the higher dignitaries of the church.

Prelude (prel'ūd), in music, originally the first part of a sonata; though, as the name implies, it may be an introduction to any piece of music. Bach and his contemporaries elaborated preludes considerably; and Chopin wrote several piano works which, though complete in themselves, he designated preludes. More recently the term has been applied to operatic introductions when they are shorter than the usual overture. Wagner in particular has prefaced most of his operas with a prelude.

Premises. See *Logic, Syllogism.*

Premonstratensians, or NORBERTINES, a religious order, founded at Prémontré, near Laon in France by St. Norbert in 1120, who gave them the rule of St. Augustine with some additional rigor. The order was introduced into England in 1146, and its members were there regularly known as the White Canons. Before the Reformation they had 2000 monasteries, among which were 500 nunneries, mostly in Germany, the Netherlands, France, England, and the north of Europe. The order is now very small.

Prentiss (pren'tis), SERGEANT S., orator, born in Portland, Maine, in 1808, removed to Mississippi in 1827. As a lawyer he was in the front rank; as a speaker was remarkable for wit, sarcasm, and argumentative power. His manner of speaking was at once natural and dramatic. He died in 1850.

Preposition (prep-u-zish'un; from L. *præpositus*, placed before), a part of speech which is used to show the relation of one object to another, and derives its name from its being usually placed before the word which expresses the object of the relation. In some languages this relation is often expressed merely by changes of the termination.

Presburg. See *Pressburg.*

Presbyopia (pres-bi-ō'pi-a), or PRESBYOPY, that is, 'old-sightedness,' an affection of the eye common at an advanced stage of life; its effect is to render objects near the eye less distinct than those at a distance. Persons affected with presbyopia generally have to use convex spectacles.

Presbyter (pres'bi-tėr; Gr. *presbyteros*, an elder), an office-bearer in the early Christian Church, the exact character and position of whom is differently regarded by different authorities. Presbyterians generally maintain

that originally *bishop* and *presbyter* were one and the same; Episcopalians generally maintain that from the first they were different, as was certainly the case in very early times. By the end of the second century the presbyters held a position in connection with the congregations intermediate between that of bishop and deacon, and represented the priests or second order of clergy.

Presbyterian (pres-bi-tē′ri-an), a name applied to those Christians who hold that there is no order in the church as established by Christ and his apostles superior to that of presbyters (see *Presbyter*), and who vest church government in presbyteries, or associations of ministers and elders, possessed all of equal powers, without any superiority among them. The Presbyterians believe that the authority of their ministers is derived from the Holy Ghost by the imposition of the hands of the presbytery; and they oppose the Independent scheme of the common rights of Christians by the same arguments which are used for that purpose by the Episcopalians. They affirm that all ministers, being ambassadors of Christ, are equal by their commission; and that Episcopacy was gradually established upon the primitive practice of making the moderator, or speaker of the presbytery, a permanent officer. These positions they maintain against the Episcopalians by the general argument that the terms bishop and presbyter are used as synonymous terms in the New Testament, and that they were used simply to designate the minister appointed by the apostles to take charge of a new church on its foundation. They therefore claim validity for the ordination after the Presbyterian form, as there was originally no higher ecclesiastic than a presbyter in the church.

The first Presbyterian church in modern times was founded in Geneva by John Calvin about 1541; and the constitution and doctrines were thence introduced, with some modifications, into Scotland by John Knox about 1560, though the Presbyterian was not legally recognized as the national form of church government until 1592. For nearly a century after this date there was a continual struggle in Scotland between Episcopacy and Presbyterianism; until ultimately by the Treaty of Union in 1707 it was agreed on the part of England and Scotland that that form of church government should be the national form of ecclesiastical government in Scotland, and that the Scotch Church should be supported as the only one established by law.—The constitution of the Scotch Church, and of the Presbyterian Church generally, is as follows:—The kirk-session is the lowest court, and is composed of the parochial minister, or ministers, if more than one, and of lay elders (usually from six to twenty); the minister, or senior minister where there are more than one, being president or moderator. This court exercises the religious discipline of the parish; but an appeal may be made from its decisions to the presbytery, and again from the presbytery to the synod. A presbytery consists of the pastors of the churches within a certain district, and of an elder connected with each, while the synod comprises the presbyteries within a certain area, their ministers and representative elders. (See *Presbytery, Synod.*) The General Assembly is the highest ecclesiastical court, its decisions being supreme. (See *Assembly, General.*) Besides the Established Church of Scotland there are other important religious bodies whose constitution is strictly Presbyterian, but who, from different principles, decline being connected with or receiving any emoluments from the state. The chief of these are the Free Church and the United Presbyterian Church.

Shortly after the Reformation Presbyterianism was in considerable strength in England, a large number of the Puritans preferring this system to episcopacy; but it subsequently declined in strength. The rule of the Stuarts, however, did much to renew its vigor, and in 1642 the Long Parliament abolished episcopacy, a measure followed by the meeting of the famous Assembly of Divines at Westminster the following year. In 1646 presbytery was sanctioned by parliament, but it was never generally adopted, or regularly organized, except in London and Lancashire. Soon after the Restoration episcopacy was restored, and about 2000 Presbyterian clergy were ejected from their cures in consequence of the Act of Uniformity in 1662. Presbyterianism has ever since been simply one of the forms of dissent in England, and has held no prominent position, though many Presbyterian churches are scattered throughout England. Of these by far the greater number are united to form a single body, the Presbyterian Church of England.—The Presbyterian Church in Ireland originated through the settlement of Scottish colonists in Ulster in the reign of James I. When Charles II attempted to force Prelacy upon the Scotch many of them took refuge in the north of Ireland, which gave the cause of Presbyterianism in that country a

fresh impulse. The favor shown them by William III was of great assistance to them; which they repaid by the part they played in the rebellion under James II, particularly in the memorable siege of Londonderry. As a test of his gratitude the king doubled the sum given for the support of their ministers, hence known as Regium Donum. The Presbyterian Church was early introduced into the United States, and has, including its several branches, a membership of about 2,000,000. The body is an important one also in Canada and other British colonies, and in Europe, its membership in the world being estimated at 12,250,000. Among Protestant churches it is surpassed in numbers only by the Episcopalians and the Methodists. The Methodists and Baptists largely exceed it in membership in the United States.

Presbytery (pres'bi-ter-i), a judicatory, consisting of the pastors of all the churches of any particular Presbyterian denomination within a given district, along with their ruling (*i.e.*, presiding) elders, there being one ruling elder from each church session commissioned to represent the congregation in conjunction with the minister. The functions of the presbytery are, to grant licenses to preach the gospel, and to judge of the qualifications of such as apply for them; to ordain ministers to vacant charges; to judge in cases of reference for advice, and in complaints and appeals which come from the church sessions within the bounds of the presbytery; and generally to superintend whatever relates to the spiritual interests of the several congregations under its charge, both in respect of doctrine and discipline. Appeals may be taken from the presbytery to the provincial synod, and thence to the general assembly.

Prescot (pres'kut), a manufacturing and market town in England, county of Lancaster, 8 miles east of Liverpool. Prescot has long been noted for the manufacture of watch-tools, watch-movements and hands, small files, etc. Earthenware, glass bottles, etc., are also manufactured. Pop. (1911), 8154.

Prescott, WILLIAM HICKLING, historian, born in Salem, Massachusetts, in 1796; died in 1859. His father was a lawyer, the son of Colonel William Prescott, who commanded the American forces at the battle of Bunker Hill. In 1811 he entered Harvard College, and was graduated in 1814. While at college he met with an accident to his left eye, completely depriving him of its use for ever afterwards, and rendering the other eventually so weak that during the latter half of his life he could scarcely use it. After two years spent in traveling through England, France, and Italy, chiefly for health, he returned to his native country, where he married, and set himself assiduously to literary labor. The earliest fruits of this were contributions to the *North American Review;* and for many years his only productions were essays and magazine articles. Acquaintance with Spanish literature, which he began to cultivate in 1824, led him to attempt his first great work on Spanish history, *The Reign of Ferdinand and Isabella*, published in 1837. It was received with enthusiasm both in America and Europe; was rapidly translated into French, Spanish, and German; and its author was elected a member of the Royal Academy at Madrid. Prescott's next work was the *History of the Conquest of Mexico, with a Preliminary View of the Ancient Mexican Civilization, and the Life of the Conqueror Hernando Cortez*, which appeared in 1843, and was received with an equal degree of favor. In 1847 he published the *History of the Conquest of Peru, with a Preliminary View of the Civilization of the Incas.* In 1855 the first two volumes of the long-expected *History of the Reign of Philip II, King of Spain*, appeared, and proved to the public equally acceptable with Prescott's former works. In 1858 was published a third volume; but the sudden death of the author from apoplexy put a stop to his labors. Prescott affords a remarkable instance of the success of indomitable industry and perseverance, carried out in spite of the affliction of partial and latterly almost total blindness.

Prescott, a city, capital of Yavapai Co., Arizona, about 180 miles N. N. W. of Tucson. It is situated in a rich gold, silver and copper mining region, and is an important trade center. Pop. 5092.

Prescription (pre-skrip'shun), in law, is a right or title acquired by use and time; the object being to secure the title to property to him who has had the possession of it for the term fixed by the law, and to prevent any one from disturbing his possession after such term has expired. In the English common law the term *prescription* is applied only to incorporeal hereditaments, as a right of way, a common, etc., and requires immemorial time to establish it. This rule was modified, however, by a statute under William IV, which provides that no right of common shall be defeated after thirty years'

enjoyment, and after sixty years the right is deemed absolute and indefeasible, unless had by consent or agreement. In claims of right of way, of water-course, and similar easements the periods are twenty and forty years. Claims to the use of light to any dwelling-house or building enjoyed for twenty years are indefeasible, unless shown to have been by consent.

By the law of Scotland prescription has a much wider operation than by the law of England. It not only protects individuals from actions which other parties might have brought against them, but in some instances creates a positive title to property. The prescription by which a right of property can be established is that of forty years. Whatever adverse right is not cut off by the other special prescriptions of shorter periods is destroyed by the long prescription, as this is called. To create a title to real property, the long prescription must be both positive and negative. The party holding the property must have been forty years in unchallenged possession, and be able to show a *prima facie* valid title; while a claimant must have been forty years without an ostensible title, and must, by not legally challenging it, have tacitly acquiesced in the possessor's title. By Scotch law, but not by English, a vicennial prescription applies to crimes, no prosecution being competent after a period of twenty years. In American practice prescription presupposes a lost grant, and can therefore give a title to those things only which can pass by grant. In almost all the States of the American Union there are express statute provisions regulating the doctrine of prescription. Generally an uninterrupted possession of twenty years is required for the acquisition of real rights. In some States a notification by the owner of the land to the occupant that his intention is to contest the title may defeat prescriptive acquisition.

Prescription, in medicine, is the form, with directions, in which a medicine or medicines are ordered or prescribed by a medical man. The several medical substances which may be contained in a prescription are distinguished by names indicative of the office performed by each. These are — 1. The *basis*, which is the principal or most active ingredient. 2. The *adjuvant*, or that which is intended to promote the action of the basis. 3. The *corrective*, intended to modify its action. 4. The *excipient*, or that which gives the whole a commodious or agreeable form. To these certain writers add a fifth, the *intermedium*, which is the substance employed to unite remedies which do not mix with each other or with the excipient, such as yolk of eggs and mucilage, employed in the preparation of emulsions. In choosing the form of a prescription it should be borne in mind that solutions and emulsions generally act with more certainty and rapidity than powders diffused through water; and these again than the semisolid and solid forms of medicine. See also *Pharmacy*.

Presentation (prez-en-tā′shun), the nomination of one or several candidates to a vacant office; commonly used in the case of a patron to a church. In England the clergyman is presented to the bishop to be instituted in a benefice; in Scotland, before the abolition of church patronage, he was presented to the presbytery for induction.

Presentment (pre-zent′ment), in law, is, properly speaking, the notice taken by a grand jury of any offense, from their own knowledge or observation, without any bill of indictment being laid before them at the suit of government.

Preserved Provisions, PRESERVES. The preservation of dead organic matter from the natural process of decay is a most useful means of increasing and diffusing the food supply of the world. Animals, vegetables, and fruits may all be easily preserved for this purpose. The preserving of fruits is an old and familiar process. This is generally effected by boiling or stewing, though drying is also frequently resorted to, where the fruit is meant to be kept intact. Fruits intended for confectionery are preserved in four different ways — 1. In the form of jam, in which the fruit is boiled with from three-fourths to about equal its weight of sugar. 2. In the form of jelly, in which the juice only is preserved, by being carefully strained from the solid portions of the fruit, and boiled with about half of its weight of sugar. 3. By candying, which consists in taking the fruits whole or in pieces, and boiling them in a clear syrup of sugar previously prepared. They absorb the syrup, which is then crystallized by the action of a gentle heat. 4. By stewing them in a syrup of sugar and water till they become soft but not broken, and transferring them with the syrup to jars. Many add pale brandy equal in quantity to the syrup. Several kinds of vegetables, as cabbages, cucumbers, cauliflowers, onions, are preserved by pickling. (See *Pickles*.) Antiseptics are used to preserve meat also,

salting being the most common process. But to preserve large quantities of vegetable and animal products for food purposes, and at the same time to keep them nearly in their fresh state, they must be subjected to one of three processes. These are — drying, refrigeration, and exclusion of air and microbic germs. With vegetables, which contain so large an amount of water in proportion to their solid and nutritious material, the process of drying is peculiarly applicable, and it is largely employed as the means of furnishing fresh vegetable food for ships in a compact and portable form, when, in addition to desiccation, compression is also employed.

The preservation of articles of food by the application of cold is the simplest of all known methods, and in such climates as the United States, Russia, etc., it is largely taken advantage of; while of late it has generated a large and increasing trade between the countries of the north and south temperate zones. In 1875 ice began to be used to preserve fresh meat in considerable quantities, which was sent from America to Europe. The use of ice has been largely replaced by refrigerating machines, by which a temperature best suited to the preservation of the material is maintained. The result is that the distribution of meat over the surface of the globe is being revolutionized. The trade between Great Britain and New Zealand in fresh mutton is now immense, and a large trade exists between Argentina and northern countries. The modern methods of refrigeration for carrying purposes consist of an air-tight room on board ship, where the meat is kept, and through which dry cold air is made to circulate by means of special machinery driven by steam, the air being first compressed and cooled by the refrigerating machines spoken of, a further cooling taking place when it is again allowed to expand.

The process of preservation by exclusion from the action of atmospheric air is yearly assuming more importance and being more largely practiced. The most perfect method, and that which is now most generally resorted to, is the enclosure of the food in air-tight cases from which the air is then expelled; upon the perfection of the air-excluding process depends entirely the preservation of the article. The first successful attempt to preserve fresh meat in this way was made in 1809 by M. Appert, a Frenchman. The plan now generally adopted is commonly known as *canning*, and is applicable alike for flesh-meats, vegetables and fruits. The process is usually as follows: — The provisions of whatever kind are packed into a tin cylinder, and the interstices filled in with water or other appropriate fluid, as gravy in the case of flesh-food. The lid, which is perforated with a small aperture or pinhole, is soldered carefully down. The cases are then set in a bath of solution of chloride of calcium; heat is applied until the whole boils, and the air is thus expelled through the pinholes. These holes are then hermetically closed, and the canister and its contents are once more subjected to the operation of heat until the provisions are perfectly cooked. When it has become cool the canister is coated over with paint and removed to the proving room, an apartment the temperature of which has been raised to the degree of temperature most favorable to decomposition. If the operation has been successfully performed, the ends or sides of the canisters will have fallen in to some extent from the outward pressure of the air. If, after the interval of some days, the ends bulge out, it is a certain sign that the process has not been successful, the liberated gases causing the outward pressure. Such cases should be rejected or submitted again to the process. Not only may boiled provisions be preserved in this way, but roast meats also. An improvement on this process has been effected by introducing into the canisters a small quantity of sulphite of soda, which causes the absorption of any traces of free oxygen which may lurk in the cases. Glass bottles are also largely used in place of tin cans, especially for household preserving. Fruits may be preserved without cooking, other than is done by pouring hot syrup into the jars and setting them, when closed, in boiling water, this being apparently sufficient to destroy the microbes. The effectiveness of the process depends on the exclusion of fermentative germs and the killing of those already present by the application of heat.

President (prez'i-dent), one who presides; a presiding officer. The supreme executive officer of the United States is styled *President.* The qualifications of a person raised to this dignity are, to be a natural-born citizen of the age of 35 years, and to have resided 14 years within the States. The election is by an electoral college, the members of which are elected by popular vote, and who subsequently meet and elect the President. In his legislative capacity the President has the power of approving bills sent to him after passing Congress, or of returning them to the house in which they originated, with his reasons for non-approval.

If he retains a bill for ten days without signing it becomes a law, unless an adjournment of Congress prevents its return, when it fails to become a law. In his executive capacity he is commander-in-chief of the army and navy; he has the power of making treaties, subject to the concurrence of two-thirds of the Senators; of appointing ambassadors, ministers, consuls, judges of the Supreme Court, and other public officials not otherwise provided for; of convening Congress in extra session when deemed necessary, and performing other executive duties. He is expected to inform the Congress at intervals on the state of the Union, and does so by a special message at the beginning of every session of Congress. He holds his office for four years and is eligible for reëlection. The similar officers in Switzerland and France, and recently in Portugal, bear the same title. See *Succession, Presidential.*

Press, Liberty of the, the liberty of every citizen to print whatever he chooses, a privilege which does not prevent his being amenable to justice for the abuse of this liberty. The right of printing rests on the same abstract grounds as the right of speech, and it might seem strange to a man unacquainted with history that printing should be subjected to a previous censorship, as it is in some countries, and has been in all, any more than speaking, and that the liberty of the press should be expressly provided for in the constitutions of most free states. But when we look to history we find the origin of this, as of many other legislative anomalies, in periods when politics, religion, and individual rights were confusedly intermingled. It is only since men's views of the just limits of government have become clearer that the liberty of the press has been recognized as a right; and to England we are particularly indebted for the establishment of this principle. The existence of a censorship of the press was for centuries, however, deemed an essential to the safety of all European governments. Liberty of printing, as we understand it, is a comparatively modern notion; Milton's plea for a free press met with no response from his own party, nor for very many years later was it the cue of any party in the English commonwealth to refrain from suppressing the writings of their political opponents. In England the liberty of the press, soon after printing was introduced, was regulated by the king's proclamations, prohibitions, charters of license, etc., and finally by the court of Star-chamber. The Long Parliament, after their rupture with Charles I, assumed the same power. The government of Charles II imitated their ordinances, and the press did not really become free till the expiration of the statutes restricting it in 1693, after which it was found impossible to pass new laws in restraint of it, and it has remained free ever since, the last restriction in England ceasing with the abolition of the newspaper stamp duty, in 1856. Such legal checks as remain are merely intended to prevent outrages on religion or decency, to protect subjects from defamation, and to conserve the copyright of authors. The constitutions of many of the United States declare, as we should expect, for liberty of the press, and one of the notable events of colonial history was a suit in New York which established liberty of the press in that colony. Within the United States as a nation there has been no question of the full liberty of the press, subject to the operation of the law for libel. The same may be said of all the South American republics. Among European countries, it may be generally said the liberty of the press is found most predominant among the weaker powers, such as Spain, Turkey, Sweden and Norway, Switzerland, and Roumania; while in Germany, Austria, and particularly in Russia, there are still many restrictions. In the British colonies the law is as in England, but in India the governor-general exercises a censorship. See *Books* (*Censorship of*).

Press, Printing. See *Printing.*

Pressburg, or Presburg (pres'burg), a town in Hungary, 35 miles east of Vienna, beautifully situated on the left bank of the Danube, and on spurs of the Little Carpathians. The most striking edifice is the ruined royal palace, on the top of an eminence, burned in 1811. The cathedral is a large Gothic structure, dating from the eleventh century, which has latterly been considerably modernized; here the kings of Hungary were crowned. The Franciscan church (thirteenth century) is also noteworthy. There are also several palaces, including that of the primate of Hungary. The river is here crossed by a bridge of boats. The manufactures are various. The trade, particularly transit, and chiefly in corn and timber, is extensive. Pressburg is a place of very great antiquity, and was long a fortress of some strength. In 1541, when the Turks captured Buda, it became the capital of Hungary, and retained the honor till the Emperor Joseph II restored it to Buda. The treaty by which Austria ceded Venice to France and the Tyrol to Bavaria was

signed here in 1805. Pop. 61,537, more than half of whom are Germans and several thousand Jews.

Pressensé (prā-sȧn-sā), Edmond de, a French Protestant minister, born at Paris in 1824. After studying under Vinet at Lausanne, and at Halle and Berlin, he became pastor of Taitbout Chapel, Paris, where he gained a high reputation as a preacher. He sat in the National Assembly (1871-75), and was made life senator in 1883. He is the author of many religious works — historical, evangelical, etc., some of which, including his *Life of Christ*, have been translated into English. He died in 1891.

Press-gang, the name given in England to a detachment of seamen who (under a naval officer) were empowered, in time of war, to lay hold of seafaring men and compel them to serve in the king's ships. This practice became obsolete during the last century, though the laws permitting it have never been repealed. No such practice has ever existed in the United States.

Prester John (Priest or Presbyter John), a legendary personage of some note. In the middle ages it was reported by travelers that there was a Christian prince who reigned in the interior of Asia under this name, and the same story was also known to the Crusaders. Who this Prester John was it is not easy to decide; the supposition that he was the Dalai Lama, or one of the chief priests of the Lamaites, does not agree with the position assigned to his residence by travelers. The Portuguese in the fifteenth century picked up a story of a Christian prince in Central Africa, and by some confusion of names they transferred thither the throne of Prester John. Hence in recent times the home of this mythical prince and priest has always been laid in Abyssinia.

Presto (pres'tō; Italian), quick, used in music to designate a faster rate of movement than is indicated by *allegro*. *Presto assai* denotes very quick, and *prestissimo* the highest degree of quickness.

Preston (pres'tun), a municipal and parliamentary borough of England, in Lancashire, 27 miles northeast of Liverpool, agreeably situated on a height above the right or north bank of the Ribble, near the head of its estuary. The environs of the town exhibit much pleasing scenery, and the town possesses three fine public parks. Among the churches Christ Church is admired for the purity of its Norman architecture; the parish church, which has been rebuilt in the decorated style of the fourteenth century, is also a fine building; and one of the Roman Catholic churches, St. Walburga's, is considered the finest in the town. The town-hall is a splendid structure; and generally the architecture of Preston is good. The river is spanned by five bridges, two of them railway bridges, one of which cost £40,000. The railway station (recently reconstructed) is very large, and is one of the most important junctions on the London and Northwestern Railway. The original staple manufacture of the town was linen, which is still woven to some extent, but has been completely eclipsed by the cotton manufacture, of which Preston is now one of the chief centers. Preston also has machine-shops, iron and brass foundries, railway-carriage works, breweries, malthouses, roperies, tanneries, etc. Some shipping trade is carried on, and extensive harbor and river diversion works have much improved the town as a port. In 1323 Preston, originally Priest's-town, was taken and burned by Robert Bruce; in the great civil war it espoused the royalist cause, and was twice captured by the Parliamentarians; in the rebellion of 1715 it was occupied by the Jacobite forces; in that of 1745 the Highlanders, headed by the Pretender, passed through Preston both on their march to London and on their retreat. Preston was the birthplace of Arkwright. Pop. (1911), 117,113.

Prestonpans (pres-tun-panz'), a small town in Scotland, in the county of Haddington, near the south shore of the Firth of Forth. It used to have a flourishing manufacture of salt: hence the name. In the vicinity is the scene of the famous battle in 1745, when the Jacobites defeated Sir John Cope and the royal forces. Pop. 2614.

Prestwich (prest'wich), a town of England, in Lancashire, 4 miles northwest of Manchester, a favorite residence of Manchester merchants. Pop. (1911) 17,195.

Presumption (pre-zum'shun), in law, is the assuming of a fact or proposition as true, and is of two kinds, *præsumptio juris* and *præsumptio juris et de jure*. The *præsumptio juris* is a presumption established in law till the contrary be proved, *e. g.* the possessor of goods is presumed to be the owner. The *præsumptio juris et de jure* is that where law or custom establishes any proposition that cannot be overcome by contrary evidence, as the incapacity in a minor with guardians to act without their consent.

Pretender. See *Charles Edward Stuart*, and *Stuart (James Edward Franeis)*.

Pretoria (prē-tō′ri-a), a city of South Africa, capital of the Transvaal Colony, 30 miles N. E. of Johannesburg, with which it is connected by rail. It is in the neighborhood of the gold fields at Lydenburg, which have increased its trade of late years. It has a white population of 21,160.

Prevention of Cruelty to Animals. See *Animals (Cruelty to)*.

Prevesa (prev′ā-zä), a fortified town of European Turkey, in the pashalic of Janina, on the northern side of the Gulf of Arta, 18 miles southwest from Arta. It has a stormy history, having been frequently blockaded and captured, and on one occasion pillaged by the Turks, it being then under France. Pop. (1905) 6500.

Prévost D'Exiles (prā-vō deg-zēl), ANTOINE FRANÇOIS, a French writer, born in 1697. Originally a member of the Jesuit order, he soon quitted it for the military service. After alternating several times between the church and the army, he gave up both professions, and in 1729 he went to Holland, where he published his *Mémoires d'un Homme de Qualité*. After a sojourn of two years in England he returned to France, and was appointed almoner and secretary to the Prince of Conti. From this period till his death in 1763 he pursued an active literary life, editing a journal called *Pour et Contre*, and publishing many romances, of which the best known are the *Histoire de M. Cleveland*, and the *Histoire du Chevalier des Grieux et de Manon Leseaut*.

Prévost-Paradol (prā-vō-på-rå-dol), LUCIEN ANATOLE, a French writer and member of the Academy, was born at Paris in 1829. In 1855 he obtained the chair of French literature in the faculty of Aix, but soon resigned, and next year became one of the editors of the *Journal des Débats*, a paper with which he never broke his connection. In 1870 he went as ambassador to the United States; but soon after his arrival put an end to his own life — his mind being, it is believed, unhinged by the news of the declaration of war by France against Prussia. He wrote *Études sur les Moralistes Français*, *Essai de l'Histoire Universelle*, *La Franee Nouvelle*, *Du Rôle de la Famille dans l'Éducation*, etc.

Priam (prī′am), in Greek legend, the last king of Troy, the son of Laomedon. By his second wife, Hecuba, he had, according to Homer, nineteen children, the most famous being Hector, Paris, Cassandra, and Troilus. His name has been rendered famous by the tragical fate of himself and his family, as a result of the Trojan war. When he was extremely old the Greeks demanded of him the restoration of Helen, who had been carried away by Paris, and on his refusal to give her up they made war against Troy, and took and destroyed the city, after a siege of ten years. Homer gives no account of the death of Priam; but other poets represent him to have been slain at the altar of Zeus by Pyrrhus the Greek.

Priapus (prī-ā′pus), a Greek deity, the deformed son of Dionysus and Aphrodite, a god of gardens, fruits, etc., considered by mythologists to represent fertility in nature. He was worshiped in all parts of Greece, and also in Rome.

Pribram (prē′brâm; *Boh*, prshē′-brâm), a town of Central Bohemia, in a district where are rich lead and silver mines. Pop. 13,576.

Pribylov Islands (prē′be-lof), or PRIBYLOFF, a group of islands on the coast of Alaska, in Behring Sea, belonging to the United States. The largest are St. Paul, St. George, Walrus and Beaver Islands. They are frequented by numbers of fur-seals. The natives are Aleutians.

Price. See *Value*.

Price (prīs), RICHARD, an English religious and economical writer, born in 1723; for most of his life a pastor to various Dissenting churches in the metropolis. He commenced his literary career in 1758 by his *Review of the Principal Difficulties in Morals*, which was followed by *Four Dissertations on the Importanee of Christianity, The Nature of Historieal Evidenee*, etc., (1767). In 1771 appeared his *Observations on Reversionary Payments and Annuities*, and later the celebrated *Northampton Mortality Tables*. He also published a number of political tracts, in one of which he advocated the cause of the American colonies in 1776. When Pitt became prime-minister he consulted Dr. Price in his schemes for the reduction of the national debt, and the establishment of the sinking fund was the result of his recommendation. At the commencement of the French revolution, in a sermon (published in 1789) *On the Love of Country*, he warmly expressed his delight at the emancipation of the French people. This discourse produced Burke's *Reflections*,

in which Dr. Price was severely treated. He died in London in 1791.

Prichard (pritch'ard), JAMES COWLES, ethnologist, born at Ross, in Herefordshire, in 1785; died at London in 1848. He studied medicine, and took the degree of M.D. at Edinburgh; commenced practice as a medical man at Bristol, and in 1810 received the appointment of physician to the Clifton Dispensary and St. Peter's Hospital. In 1813 he published his great work, *Researches into the Physical History of Mankind*, and in 1843 appeared his *Natural History of Man*. He wrote many minor works on ethnology, besides treatises on various medical subjects. In 1845 he left Bristol for London, where he died.

Prickly Ash, a name given to several prickly shrubs of the United States, genus *Xanthoxylum*, order Rutaceæ. They have an aromatic and pungent bark, which from being used as a remedy for toothache gains them the name of *toothache-tree*.

Prickly Heat, the popular name of an eruptive skin disease occurring in hot weather or in hot climates. It is characterized by the elevation of the papules of the skin and intense itching. While annoying, it is not in the least dangerous. One familiar variety of it is known as *Lichen tropicus*. See *Lichen*.

Prickly Pear, *Opuntia vulgāris*, nat. order Cactaceæ, otherwise called Indian fig. The opuntia is a fleshy and succulent plant, destitute of leaves, covered with clusters of spines, and consisting of flattened joints inserted upon each other. The fruit is purplish in color, covered with fine prickles, and edible. The flower is large and yellow. It is a native of the tropical parts of America, whence it has been introduced into Europe, Mauritius, Arabia, Syria, and China. It is easily propagated, and in some countries is used as a hedge-plant. It attains a height of 7 or 8 feet.

Prickly Pear (*Opuntia vulgāris*).

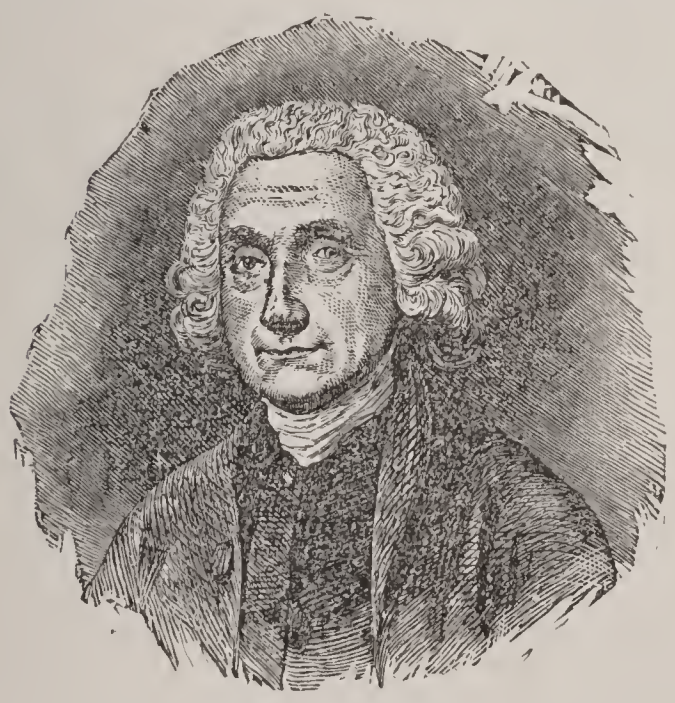
Prideaux (pri'dō), HUMPHREY, an English divine, born at Padstow, Cornwall, in 1648. He was successively prebendary of Norwich, rector of Bladen, rector of Soham, archdeacon of Suffolk, vicar of Trowse, and dean of Norwich. His chief works were *The Old and New Testaments Connected in the History of the Jews and Neighboring Nations*, and a *Life of Mohammed*. He died in 1724.

Pride of India. See *Melia*.

Priest (prēst; Hebrew, *kôhên;* Greek, *hiereus;* Latin, *sacerdos*), in its most general signification, a man whose function is to inculcate and expound religious dogmas, to perform religious rites, and to act as a mediator between worshipers and whatever being they worship. In some countries the priesthood has formed a special order or caste, the office being hereditary; in other countries it has been elective. In sacred history the patriarchal order furnishes an example of the family priesthood. Abraham, Isaac, and Jacob perform priestly acts, and 'draw near to the Lord,' as also does Job, and the Arab sheikh to this hour unites in his person the civil and religious headship. The Mosaic priesthood was the inheritance of the sons of Aaron, of the tribe of Levi. The order of the priests stood between the high-priest on the one hand and the Levites on the other. (See *High-pricst* and *Lcvitcs.*) The ceremony of their consecration is described in Exodus xxiv and Leviticus viii. They wore a special dress, and their actions were in many cases prescribed strictly by the Mosaic law. Their chief duties were to watch over the fire on the altar of burnt offerings, and to keep it burning continually; to offer a lamb morning and evening, and two lambs on the Sabbath, each accompanied with a meat-offering and a drink-offering at the door of the tabernacle. These were fixed duties which never varied, but their chief function was their being always at their post to do the priest's office for any guilty, penitent, rejoicing, or thankful Israelite. As their functions necessarily took up the greater part of their time, a distinct provision had to be made for them by tithes, a share of spoil taken in war, of the offerings, etc. On the settlement of the Jews in Canaan the priestly order had thirteen cities allotted to them, with pastures for their flocks. In the time of David the priestly order was divided into twenty-four courses, each of which was to serve in rotation for one week, while the further assignment of special services during the week was determined by lot. The division thus instituted was confirmed by Solomon, and continued to be recognized as the typical number of the priesthood. In the New Testament believers generally are regarded

as having the character of priests, and it is held by many Protestants that the idea of a consecrated priesthood invested with sacrificial functions is repugnant to Christianity. In some churches, therefore, the name priest is not used, minister, pastor, etc., being the term employed instead. Those Christians, however, who, like the Roman Catholics, Greeks, etc., look upon the eucharist as a sacrifice, regard the priest as performing sacrificial duties, and as standing in a special relation between God and his fellow-man. The priests of the Church of Rome are bound to a life of celibacy; but in the Greek Church a married man may be consecrated a priest. In the Anglican and other Episcopal churches the priests form the second order of clergy, bishops ranking first. Diverse views of the priestly office are held in the Anglican and allied churches.

Priestley (prēst'li), Joseph, an English scientist and divine, was born in 1733 near Leeds. His father was a clothier, of the Calvinistic persuasion, in which he was also himself brought up. At the age of nineteen he was placed at the Dissenting academy at Daventry, with a view to the ministry, where he spent three years. He there became acquainted



Joseph Priestley.

with the writings of Dr. Hartley, which made a great impression upon his mind; and he was gradually led into a partiality for Arianism. On quitting the academy in 1755 he accepted an invitation to become minister at Needham Market, in Suffolk, where he had to live as best he could on an average salary of £30 a year. His views did not, however, prove palatable to his congregation, who mostly deserted him, and in 1758 he undertook the charge of a congregation at Nantwich, in Cheshire, to which he joined a school. About this time he published his first work, *The Scripture Doctrine of Remission*. In this he rejected the doctrines of the Trinity and the Atonement. In 1761 he became a teacher in the Dissenting academy at Warrington, and while here wrote a *History of Electricity*, which gained him admission to the Royal Society, and the degree of LL.D. from the University of Edinburgh. In 1767 he became minister of the Mill Hill chapel at Leeds, where his religious opinions became decidedly Socinian. While here he published his *History and Present State of Discoveries relating to Vision, Light, and Colors* (1772), his next important work being *Institutes of Natural and Revealed Religion* (1772-74). After a residence of six years at Leeds he accepted an invitation from the Earl of Shelburne, afterwards Marquis of Lansdowne, to reside with him as a companion in the nominal capacity of librarian, with a salary of £250, an appointment which gave him ample opportunities for prosecuting scientific research. In 1774 he discovered oxygen, or 'dephlogisticated air,' as he called it, a result which was quickly followed by other important discoveries in chemistry. Among his works belonging to this period are *Experiments and Observations on Different Kinds of Air; An Examination of Dr. Reid's Inquiry into the Human Mind; Hartley's Theory of the Human Mind; The Doctrine of Philosophical Necessity;* etc. Some of his philosophical works brought about differences between himself and his patron, and the connection was dissolved in 1780, Priestley retaining an annuity of £150 per annum. He next removed to Birmingham, where he became once more minister of a Dissenting congregation, and wrote *History of the Corruptions of Christianity; History of Early Opinions concerning Jesus Christ; General History of the Christian Church;* etc. Owing to his favorable opinions regarding the French revolution a mob assembled and set fire to Dr. Priestley's house, and in the conflagration his apparatus and manuscripts were destroyed. For this insane outrage he received compensation, but according to his own estimate too little by £2000. On quitting Birmingham he became president of the Dissenting college at Hackney, but was goaded by party enmity to seek an asylum in the United States in 1794. He took up his residence at Northumberland, in Pennsylvania, where he died in 1804. He is regarded

as the founder of Unitarianism in the United States. As a man of science he stands high, while as a theologian, and especially as a historical theologian, he ranks low. As a metaphysician he holds a respectable position. But his great natural powers were so distributed in attacking subjects the most varied that he never attained such excellence in any one branch as his talents deserved.

Priluki (prē-lö′kē), a town of Russia, in the government of Poltava, on the Udai. Pop. 19,055.

Prim, JUAN, MARQUIS DE LOS CASTILLEJOS, COUNT DE REUSS, Field-marshal and Grandee of Spain, was born at Reuss, in Catalonia, in 1814. He was destined for the law, but on the outbreak of the civil war which followed the death of Ferdinand VII (September 29, 1833) he joined the volunteers who had taken up arms in the cause of the infant queen Isabella, and rose so rapidly that in 1837 he was appointed a colonel in the regular army. When Queen Maria Christina quitted Spain he allied himself politically with the Progresista party, and vigorously opposed Espartero, who had assumed the regency, May 8, 1841. During the next two years he was engaged in more than one insurrectionary movement. On the downfall of the Espartero ministry Prim was appointed by the queen a brigadier-general, and afterwards created Count de Reuss and governor of Madrid (1843). On the occasion of a democratic rising at Barcelona he was sent to restore order, but with little success. The revolt soon began to attain wide proportions, and Prim was accused of dilatoriness and dismissed from his command. In November, 1844, he was brought to trial for his share in a conspiracy for the assassination of Narvaez, president of the council, and convicted and sentenced to six years' seclusion in a fortress, a sentence which was revoked by the queen in January, 1845. After some years of service under the Turks he returned to Spain, and was in 1857 promoted to the rank of lieutenant-general, and in 1858 raised to the senate. In the following year, war having broken out between Spain and Morocco, Prim was appointed to the command of the reserve, and his successes in this war gained him the title of Marquis de los Castillejos. In 1861 he was appointed to command the Spanish contingent, which, along with others from England and France, was sent out to Mexico, but he withdrew along with the English. In January, 1866, he headed a revolt against the government of O'Donnell; but the insurrection was speedily suppressed, and he was compelled to take refuge in Portugal. After some years of seclusion he returned to Spain, and assisted greatly the movement which ended in the downfall of Queen Isabella; after which he was appointed minister of war, and exerted himself to find a suitable candidate for the Spanish crown. This was at last found in the person of Amadeo, duke of Aosta, second son of the King of Italy. On December 28, 1870, Marshal Prim was shot by assassins, and died next day.

Primage (prī′mij), a percentage on the amount of freight paid by shippers to the master of a vessel, or more commonly to the owner or charterer, for the trouble of loading and unloading cargo.

Primary (prī′ma-ri), in geology, a term applied by the early geologists to rocks of a more or less crystalline structure, supposed to owe their present state to igneous agency. They were divided into two groups: *stratified*, consisting of gneiss, mica schist, argillaceous schist, hornblende schist, and all slaty and crystalline strata generally; and *unstratified*, these being chiefly granite. By geologists of the present day the term primary is used as equivalent to *palæozoic*, the name given to the oldest known group of stratified rocks, extending from the Precambrian to the Permian formation. See *Geology*.

Primary Schools, the same as elementary schools. See *Education*.

Primate (prī′mat), in the early Christian Church the title assumed by the bishop of the capital of a province, and hence equivalent to metropolitan. In Africa the title belonged to the bishop who had been longest ordained. In France the Archbishop of Lyons was appointed primate of the Gauls by Gregory VII in 1079. In the German Empire the Archbishop of Salzburg was primate. In the Church of England both the archbishops still retain the title of primate, the Archbishop of Canterbury being distinguished as the 'Primate of all England,' and the Archbishop of York as the 'Primate of England.' In the Protestant Episcopal Church of Ireland the Archbishop of Armagh is primate, as formerly when the church was established.

Primates (prī-mā′tēz), the name given by Linnæus in his system of nomenclature to the first order of mammals. He placed this first, because he ranked man among the primates. The apes are included in the same order.

Primaticcio (prē-mȧ-tich′ō), FRANCESCO, an Italian

painter of the Bolognese school, born at Bologna in 1490. He received his first instruction from Innocenzo da Immola, and completed his studies under Giulio Romano. In connection with several of the pupils of the latter he painted the Palazzo del Tè, in Mantua, from Giulio's designs. Through the recommendation of Frederick, duke of Mantua, Primaticcio was taken into the service of Francis I of France in 1531. He did much to improve the palace at Fontainebleau, and gave a new impetus to French art. He made a collection of antique statues in Italy for Francis, and was appointed successor to Rosso as royal painter. He died in 1570.

Prime (prīm), in the Roman Catholic Church one of the canonical hours, and also the service in the breviary which falls to be performed at that time. The term is derived from the Latin *prima* (that is, *prima hora*, first hour), because prime begins with the first hour of the day according to the Eastern mode of reckoning, namely, 6 o'clock.

Prime Conductor, that part of an electric machine from which sparks are usually taken.

Prime Minister, or PREMIER. See *Ministers.*

Prime Number, a number which can be divided exactly by no number except itself and unity.

Priming (prīm'ing), in steam-engines, the entrance of water spray along with steam into the cylinder of an engine. It always causes great annoyance. The use of muddy water, insufficient steam-room, carelessly constructed flues and pipes, etc., in the boiler, give rise to priming. Superheating the steam is one remedy. Priming valves, a species of spring valves, fitted to the cylinder, are so adjusted as to eject priming by the action of the piston.

Primogeniture (prī-mō-jen'i-tūr), the right of the eldest son and those who derive through him to succeed to the property of the ancestor. The first-born in the patriarchal ages had among the Jews a superiority over his brethren, but the 'insolent prerogative of primogeniture,' as Gibbon denominates it, was especially an institution developed under feudalism. Before the Norman conquest the descent of lands in England was to all the sons alike, but later the right of succession by primogeniture came to prevail everywhere, except in Kent, where the ancient gavelkind tenure still remained. The right of primogeniture is entirely abolished in France and Belgium, but it prevails in some degree in most other countries in Europe. The rule operates only in cases of intestacy, and is as follows: — When a person dies intestate, leaving real estate, his eldest son is entitled by law to the whole. If the eldest son is dead, but has left an eldest son, the latter succeeds to the whole of the property. If the whole male line is exhausted then the daughters succeed — not in the same way, however, but jointly, except in the case of the crown, to which the eldest succeeds. In the United States no distinction of age or sex is made in the descent of estates to lineal descendants.

Primrose (prim'rōs; *Primŭla*), a genus of beautiful low Alpine plants, nat. order Primulaceæ. Some are among the earliest flowers in spring, as the common primrose, the oxlip, and cowslip; and several Japanese and other varieties are cultivated in gardens as ornamental plants. The varieties of the common primrose which have arisen from cultivation are very numerous.

Primrose League, THE, a political society of English women founded for the furtherance of conservative opinions in England, and named after the favorite flower of Earl Beaconsfield, one year after his death, April 19, 1881. This anniversary is observed by the wearing of the primrose and the annual meetings in each great center of population.

Primulaceæ (prim-u-lā'se-ē), the primrose order of plants, a nat. order of monopetalous exogens, distinguished by the stamens being opposite to the lobes of the corolla, and having a superior capsule with a free central placenta. It consists of herbaceous plants, natives of temperate and cold regions. Many have flowers of much beauty, and some are very fragrant. See *Primrose.*

Prince (prins; Latin, *princeps*), literally one who holds the first place. In modern times the title of prince (or princess) is given to all sovereigns generally.

Prince Albert, a town of Saskatchewan, Canada, on Saskatchewan River. It has lumber, grain and cattle interests. Pop. 6254.

Prince Edward Island, an island forming a province of the Dominion of Canada, in the Gulf of St. Lawrence, and separated by Northumberland Strait from New Brunswick on the east and Nova Scotia on the south; greatest length, from east to west, about 130 miles; breadth, varying from 4 to 34 miles; area, about 2134 square miles. The coast line presents a

remarkable succession of large bays and projecting headlands. The surface undulates gently, nowhere rising so high as to become mountainous or sinking so low as to form a monotonous flat. The island is naturally divided into three peninsulas, and the whole is eminently agricultural and pastoral, the forests now being of comparatively limited extent. The soil consists generally of a light-reddish loam, sometimes approaching to a strong clay, but more frequently of a light and sandy texture. The prevailing rock is a reddish sandstone, but a large part of the surface is evidently alluvial. The climate is mild; winter, though longer and colder than in England, is free from damp, unwholesome chills; and summer, without being oppressively hot, is fitted to promote the growth of all the ordinary cereals. Sheep, cattle, and horses are reared in numbers; cod, mackerel, herring, oysters and lobsters form the most productive part of the fisheries. The manufactures are chiefly confined to linen and flannels for domestic use; there are also several tanneries, and shipbuilding is carried on to a considerable extent. The exports consist of timber, agricultural produce, and live stock; the imports of dry goods, hardware, cordage, iron, etc. A railway runs from one end of the island to the other. The capital is Charlottetown. The public affairs of the island are administered by a lieutenant-governor nominated by the crown, who appoints an executive council of nine members. There is also a legislative council of thirteen and a house of assembly of thirty members, both chosen by the people. There is an excellent educational system, the elementary schools being free. The island is supposed to have been discovered by Cabot. It was first colonized by France, captured by Britain in 1745, restored and recaptured, and finally in 1873 was admitted to the Dominion of Canada. Pop. 93,728.

Prince of Wales, the title of the heir-apparent of the British throne, first conferred by Edward I on his son (afterwards Edward II) at the time of his conquest of the Principality of Wales. Edward III was never Prince of Wales, but the title has been conferred on all the male heirs-apparent to the English (and afterwards the British) throne from Edward the Black Prince, son of Edward III. The heir-apparent is made Prince of Wales and Earl of Chester by special creation and investiture, or by proclamation, but as the king's eldest son he is by inheritance Duke of Cornwall. As heir to the crown of Scotland the Prince of Wales bears the titles of Prince and High-steward of Scotland, Duke of Rothesay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles, in virtue of an act of the Scottish Parliament of 1469. The title of Duke of York is also borne by the present Prince of Wales. The arms of the Prince of Wales are the royal arms, with the addition of a label of three points argent, and any other addition that may be adopted. The Prince of Wales has also a badge, consisting of a plume of three white ostrich feathers, with the motto *Ich dien* ('I serve').

Prince of Wales Island. See *Penang.*

Prince Rupert's Drops, drops of glass thrown while in a state of fusion into water, and thus suddenly consolidated, taking generally a form somewhat like a tadpole. The thick end may be subjected to the smart blow of a hammer without breaking, but should the smallest part of the tail be nipped off, or the surface scratched with a diamond, the whole flies into fine dust with an almost explosive force. This phenomenon is due to the state of strain in the interior of the mass of glass, caused by the sudden consolidation of the crust which is formed while the internal mass is still liquid. This tends to contract on cooling, but is prevented by the molecular forces which attach it to the crust. This interesting and philosophical toy receives its name from being invented or brought first into notice by Prince Rupert, nephew of Charles I.

Prince's Feather. See *Amaranthaceæ.*

Prince's Metal, or PRINCE RUPERT'S METAL, a mixture of copper and zinc.

Princeton (prins'tun), a city, capital of Gibson Co., Indiana, 27 miles N. of Evansville. It is an important grain and cattle market, and has manufactures of paints, tiles, carriages, canned goods, etc. Pop. 6448.

Princeton, a small town of Mercer county, New Jersey, 40 miles N. E. of Philadelphia, and about 10 miles N. E. of Trenton. It has gained distinction as the seat of Princeton University, one of the first collegiate institutions of this country, founded as the College of New Jersey in 1746 under Presbyterian control. The title of Princeton University was assumed in 1896, on its one hundred and fiftieth anniversary. Among its graduates have been James Madison, fourth President of the United States, and many very eminent men. There is here also the oldest and largest

theological seminary in America. The university has a library of about 300,000 volumes and about 1500 students. Pop. 5136.

Principal (prin'si-pal), the term used in the United States to designate the proprietor, chief, or head of an academy or seminary of learning.

Principal and Agent, a designation in law, applied to that branch of questions which relate to the acting of one person for another in any commercial transaction. See *Agent*, *Broker*, *Factor*.

Printing (print'ing), in a general sense, is the art of stamping impressions of figures, letters, or signs, with ink, upon paper, vellum, cloth, or any similar substance; but the term is also applied to the production of photographs from negatives, where neither ink nor pressure is used. Printing may be done (1) from engraved metal plates, in which the ink is stored for transference in the sunk or incised lines of the pattern (see *Engraving*); (2) from a level surface, as polished stone, where the ink is confined to the lines by a repellent medium (see *Lithography*); or (3) from surfaces in relief, where the ink is transferred from the raised characters, which may be either on one block or on separate or movable types. The latter method is so much the more important that it gives its restricted meaning to the term *printing*, unless where otherwise qualified.

History.—The rudiments of the art of *typography* or *letterpress-printing* were undoubtedly known to the ancients so far as the taking of impressions from blocks is concerned, and this method is still practiced in China. The ancient Romans made use of metal stamps, with characters engraved in relief, to mark their articles of trade and commerce; and Cicero, in his work *De Natura Deorum*, has a passage from which Toland imagines the moderns have taken the hint of printing. Cicero orders the types to be made of metal, and calls them *formæ literarum*, the very words used by the first printers. In Virgil's time, too, brands with letters were used for marking cattle, etc., with the owner's name.

Block-printing in Europe, from single pieces of wood, can be traced back as far as the thirteenth century. In these blocks the lines to be printed were in relief as in modern wood-engraving, and each leaf of the book was printed from a single block. The leaves were usually printed only on one side of the paper, the blank sides being afterwards pasted together so as to give the volume the ordinary book appearance. By the middle of the fifteenth century block-book making was a distinct craft in Germany and the Netherlands. Among the earliest species of German origin is an *Apocalypsis*, containing forty-eight illustrations on as many leaves; and among those of Netherlandish origin, the *Biblia Pauperum* of forty leaves, both works of the early fifteenth century.

It is a matter of much dispute to whom is due the merit of adopting movable types. The invention has long been popularly credited to Johan Gutenberg, but critical examination of early Dutch and German specimens and historical evidence would seem to point to Laurens Janszoon Coster, of Haarlem, as the first inventor. (See *Coster*, *Gutenberg*.) The date of the Haarlem invention is variously placed between 1420 and 1430. Coster's types were first of wood, then of lead, and lastly of tin; the first book printed from movable types being probably one entitled *Speculum Nostræ Salutis*. Gutenberg in 1449 connected himself with a rich citizen in Mainz, named Johann Fust or Faust, who advanced the capital necessary to prosecute the business of printing. Soon after (probably in 1453) Peter Schöffer, who afterwards became Fust's son-in-law, was taken into copartnership, and to him belongs the merit of inventing matrices for casting types, each individual type having hitherto been cut in wood or metal. The oldest work of any considerable size printed in Mainz with cast letters, by Gutenberg, Fust, and Schöffer, finished about 1455, is the *Latin Bible*, which is called the *Forty-two-lined Bible*, because in every full column it has forty-two lines; or the *Mazarin Bible*, from a copy having been discovered in the library of Cardinal Mazarin in Paris. Fust having separated from Gutenberg in 1456, and obtained the printing-press for his own use, undertook, in connection with Peter Schöffer, greater typographical works, in which the art was carried to higher perfection. Fust was particularly engaged in the printing of the *Latin and German Bible*, the first copies of which, bearing date, were printed in 1462. Fust is said to have died of the plague in 1466 at Paris, upon which Peter Schöffer continued the printing business alone at Mainz. After the separation of Gutenberg and Fust the former had found means to procure a new printing-press, and had printed many works, of which the most remarkable is the *Astrological and Medical Calendar* (in folio, 1457). In 1462 the city of Mainz was taken and sacked by Adolphus, count of Nassau, and this circumstance is said to have so deranged the establishment of Fust and

Schöffer that many of their workmen were obliged to seek employment elsewhere. The truth seems to be that the inventor of the new art was Coster; that Gutenberg and Schöffer made important improvements on it, and aided by Fust widely spread the results of the new art. From this period printing made rapid progress throughout Europe. In 1465 we find works printed at Naples; and in 1467 Sweynheim and Pannartz, two of the most celebrated and extensive old printers, established themselves at Rome. In 1469 we find printing at Venice and Milan; in 1470 at Paris, Nuremberg, and Verona; and by 1472 the art had become known in all the important cities of the continent. In 1490 it had reached Constantinople, and by the middle of the next century had extended to Russia and America.

At the invention of printing the character of type employed was the old Gothic or German. The *Roman* type was first introduced by Sweynheim and Pannartz at Rome in 1467, and the *Italie* by Aldus Manutius about 1500. Schöffer, in his edition of Cicero's *De Officiis*, produces for the first time some Greek characters, rudely executed; but the earliest complete Greek work was a grammar of that language printed at Milan in 1476. The *Pentateuch*, which appeared in 1482, was the first work printed in the Hebrew character, and the earliest known *Polyglot Bible* — Hebrew, Arabic, Chaldaic, Greek, Latin — issued from the press of Genoa in 1516. Several printers' names have become famous not only for the beauty of their types, but also for the general excellence of their productions. Among these may be noted: The Aldi of Venice (1490-1597), Baden of Paris (1495-1535), Estiennes or Stephens of Paris (1502-98), Plantin of Antwerp (1514-89), Wechel of Paris and Frankfort (1530-72), Elzevir of Leyden and Amsterdam (1580-1680), and Bodoni of Parma (1768-1813).

The art of printing was first introduced into England by William Caxton, who established a press in Westminster Abbey in 1476. (See *Caxton.*) In the midst of a busy mercantile life, while resident in the Netherlands, he began about 1468 to translate *Le Recueil des Histoires de Troye* of Raoulle le Fevre. This work was finished in 1471, and Caxton set about learning the new art of printing, with the view of publishing his book. The *Recueil*, the first English printed book, appeared in 1474, printed either at Bruges or Cologne. In 1475 *The Game and Playe of the Chesse*, the second English book printed, appeared at Bruges, and in 1476 he began to practice the new art at Westminster. The first book printed in England, the *Dictes and Sayings of the Philosophers*, was printed in November, 1477. Between that date and 1491 Caxton printed upwards of seventy volumes, including the works of Lydgate, Gower, Chaucer, Malory, etc. Upwards of twenty-two of these were translated by himself from French, Dutch, or Latin originals. The whole amounted to more than 18,000 pages, nearly all of folio size, some of the books having passed through two editions, and a few through three. Caxton distinguished the books of his printing by a particular device, consisting of the initial letters of his name, with a cipher between. His first performances were very rude, the characters resembling those of English manuscripts before the Conquest. Most of his letters were joined together; the leaves were rarely numbered, the pages never. At the beginning of the chapters he only printed, as the custom then was, a small letter, to intimate what the initial or capital letter should be, leaving that to be made by the illuminator, who wrote it with a pen, with red, blue, or green ink.

Caxton's two most distinguished successors were Wynkin de Worde and Richard Pynson. The former, a native of the Dukedom of Lorraine, served under Caxton, and after the death of his master successfully practiced the art of printing on his own account. The books which he printed are very numerous, and display a rapid improvement in the typographical art. He died in 1534. Pynson was a native of Normandy, and it is supposed that he also served under Caxton. The works which he printed are neither so numerous nor so beautiful as those of Wynkin de Worde. He was the first printer, however, who introduced the Roman letter into England. To Wynkin de Worde and Pynson succeed a long list of ancient typographers, into which we cannot enter here.

The first Scottish printers of whom we have any authentic account were Walter Chapman, a merchant in Edinburgh, and Andrew Millar, who, in consequence of a patent from James IV, established a press at Edinburgh in 1507. In 1536 Thomas Davidson printed, 'in the Fryere's Winde,' Edinburgh, the *Chronicles of Scotland*, by Boethius, and in 1540 the works of Sir David Lindsay. Robert Leprevik printed extensively both at Edinburgh and St. Andrews. Thomas Vautrollier was another old Scottish printer, who brought out, in 1585, Calvin's *Institutes;* in 1589 Tusser's *Points of Good Husbandry;* and in 1597 the *De-*

monologie of King James VI. Edward Raban, a native of Gloucestershire or Worcestershire, introduced the art into Aberdeen about 1620-22, and continued printing there till 1649. In 1638 George Anderson, by special invitation of the magistrates, set up the first printing-press in Glasgow. In later days Scotland highly distinguished itself by the extent and beauty of its typographical productions. Ruddiman, who flourished at Edinburgh during the first half of the eighteenth century, was one of the most learned printers which any country has produced. Printing was introduced in the New England States of America in 1639, the first known print being the *Freeman's Oath;* in 1640 what is known as the *Bay Psalm-book* was printed in Cambridge, Massachusetts. Benjamin Franklin was one of the first to study and practice the art of printing at Boston, and afterwards practiced it for a long time in Philadelphia.

Processes.— The various letters and marks used in printing are cast on types or rectangular pieces of metal, having the sign in relief on the upper end. These types, with the low pieces required to fill up spaces, are placed in cells or boxes in a shallow tray or case in such way that any letter can be readily found. The cases are mounted on a stand or frame, so that they may lie before the person who is to select and arrange the types, technically styled a *compositor.* The Roman types used are of three kinds: an alphabet of large capitals (A B C, etc.), one of small capitals (A B C, etc.), and one of small letters (a b c, etc.), called *lower-case* by the compositor. Of italic characters only large capitals and lower-case are used. Besides these there are many varieties of letter, such as Old English, and imitations of manuscript letters, the mention of which could only be serviceable to the practical printer. Types are of various sizes, the following being those in use among British printers for book work: — English, Pica, Small Pica, Long Primer, Bourgeois, Brevier, Minion, Nonpareil, Pearl, Diamond. English has $5\frac{1}{3}$ lines and Diamond 17 lines in an inch. Type is now cast on the standard point system, pica, or 12 point, being the standard. Six pica ems measure 1 inch. Brevier type is equal to 8 point, nonpareil 6 point. The other types named above are irregular sizes as measured by the point system. All sizes from $5\frac{1}{2}$ to 12 point are made. Large, display type fonts are multiples of 6 point. (This Encyclopædia is set in Minion, or 7 point.)

Composing.— The main part of the work of a compositor consists in picking up types from their respective boxes, as required to reproduce the words in the author's manuscript that has been supplied to him. The types are lifted by the right hand and placed in a composing stick held in the left. The composing stick is a sort of box wanting one side, and having one end movable to enable it to be adjusted to any required length of line. When the words in the stick have increased till they nearly fill the space between the ends they are 'spaced out,' that is, the blanks between the words are so increased or diminished as to make them exactly do so. Line is in this way added to line till the stick is full, when it is emptied on to a flat board with edges, called a *galley.* Subsequently the column of types so produced is divided into portions of definite length, these are furnished with headlines and folios, and become pages.

The matter so set up is now proofed; that is, an impression is printed from it, and this goes into the hands of the printer's reader. The reader compares the proof with the author's manuscript, marks all deviations, and corrects the compositor's errors. When these have been put right a fresh proof is taken and is sent to the author for his inspection. When the pages of a book are finally passed by the author as correct, they may be arranged either for casting (done by stereotype or by electrotype process) or for going to press to be printed from. If the former, they are fixed, probably singly, in a rectangular frame of iron, or *chase,* as it is called, by means of wedges, and sent to the foundry. If the latter, so many of them as are required to cover one side of the sheet of paper to be printed on are fixed in a correspondingly larger frame and sent to the printing press or machine. The pages thus arranged and fixed in the chase is called a *forme.* They are placed in such order that when the impression is taken off, and the sheet folded, the pages will follow each other in proper order.

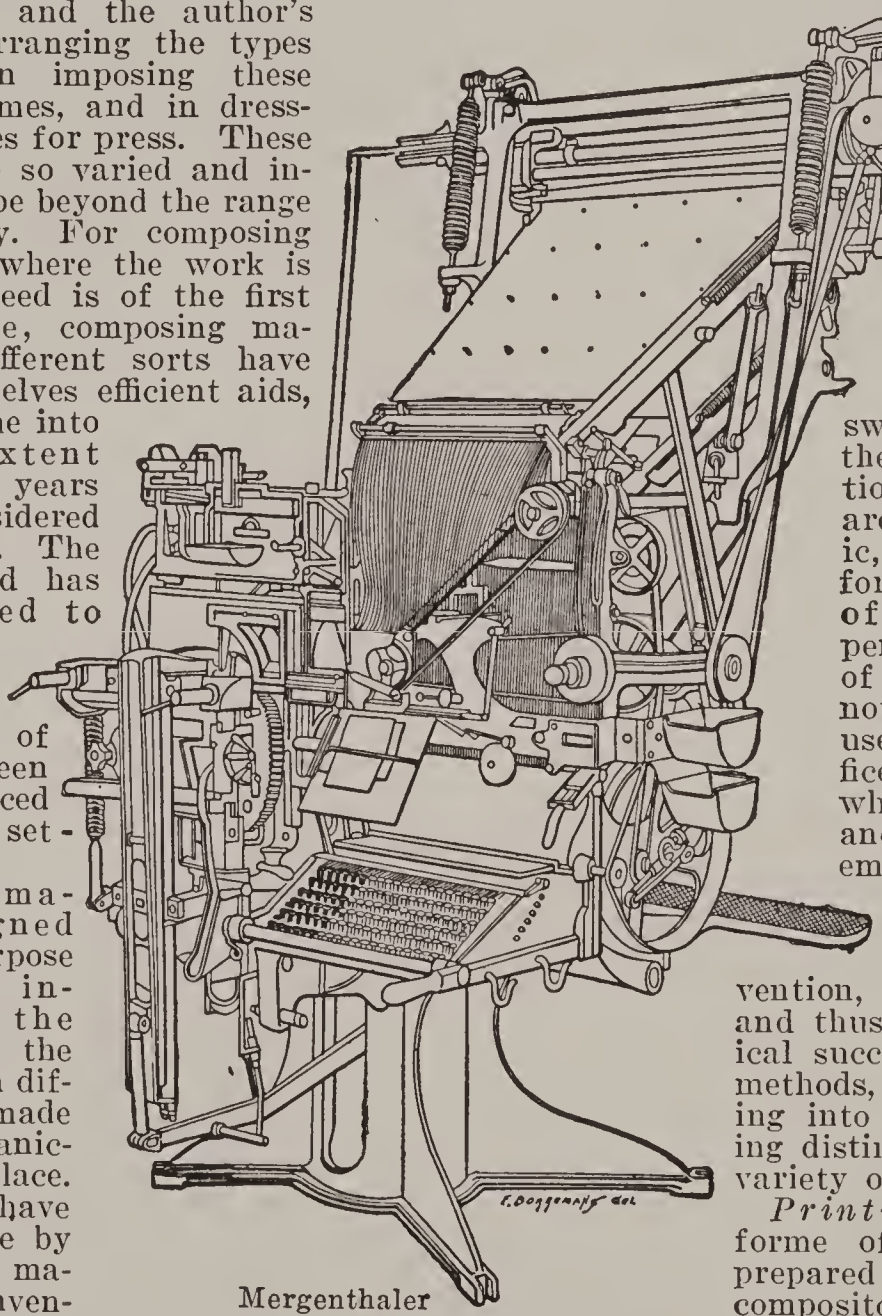
When there are more sheets than one in a work it is advisable to have these readily distinguishable from each other. To secure this, letters (called *signatures*) are placed at the bottom of the first page of each sheet, A for the first sheet, B for the second, C for the third, and so on through the alphabet. Thus, by merely looking at the signature the binder of the book can be sure that the sheets follow in proper sequence.

When the required number of copies have been printed from a forme of movable type, or when casts have been taken from a page, the chase is carried back

to the composing room, and the compositor undoes the work that was formerly done, by *distributing* all the types, that is, putting them back into their respective cells in the case. They are then ready for further combinations as required.

Composing Machines.— Several attempts have been made to expedite the work of the compositor by calling in the aid of machinery. A large portion of the compositor's work consists in correcting the reader's and the author's proofs, in arranging the types in pages, in imposing these pages in formes, and in dressing the formes for press. These processes are so varied and intricate as to be beyond the range of machinery. For composing newspapers, where the work is plain and speed is of the first consequence, composing machines of different sorts have proved themselves efficient aids, and have come into use to an extent that a few years ago was considered very unlikely. The same method has been applied to bookmaking and the old system of hand-setting of types has been largely replaced by machine-setting.

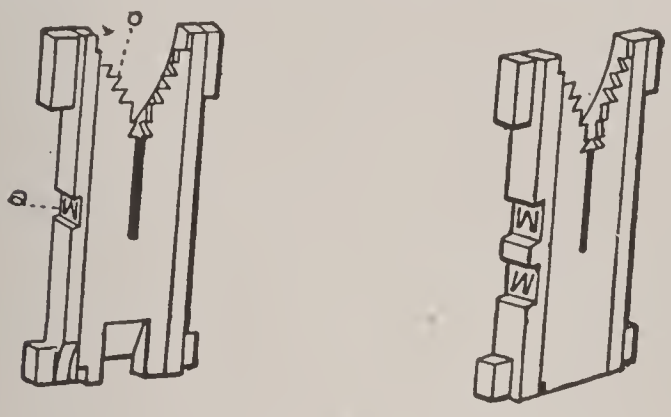
Various machines designed for this purpose have been invented, in the earlier ones the types being in different ways made to fall mechanically into place. But all these have been set aside by the linotype machine, the invention of Ottmar Mergenthaler, this being not only a composing but a type-casting machine. In its main features the linotype is wholly unlike any previous machine. No types are used; metal matrices similar to those employed by typefounders take their place. The few of these matrices used are stored in vertical channels as types are in other machines, and they are similarly brought together into words and lines on the manipulation of keys on a keyboard somewhat like a typewriter's by the compositor. When a line of matrices is composed it is removed to another part of the machine, where it is automatically spaced out, then molten metal is injected into it, a 'line-o'-type' cast in one piece is produced; this line, dressed by cutters to correct thickness and height, takes its place in a column, while the matrices themselves go back along rails, and drop off into their respective channels as they are reached. When it is remembered that after the compositor has set up the line of matrices, checked it as correct, and turned a switch, the whole of the subsequent operations indicated above are purely automatic, some idea may be formed of the amount of ingenuity expended on this piece of mechanism. It is now universally in use in newspaper offices in America, where it was devised, and is very largely employed in bookmaking. Another machine, the Monotype, of later invention, casts single types, and thus forms a mechanical successor to the older methods, and is now coming into extensive use, being distinguished by a rich variety of type faces.



Mergenthaler
Linotype Typesetting Machine.

Printing.— When the forme of types has been prepared for press by the compositor it is passed over to the pressmen, who form a distinct craft. The act of printing has two operations. First there is the application of ink to the face of the type, and then the pressing of a sheet of paper on the types with such weight as to cause the ink to adhere to it. The ink used is a thick, viscid fluid made of boiled linseed-oil and lampblack. It is applied to the type by means of a roller covered with an elastic compound of melted glue and treacle. When the

printing is being done on hand-press the roller is carried on a light frame having handles, by which it is gripped by the hands of the pressman or printer, who in working passes the roller several times over an inked table, and then backwards and forwards over the forme. When the printing is done on machine, two or more rollers are placed in suitable bearings, and generally the forme is made to travel



Linotype Matrices.

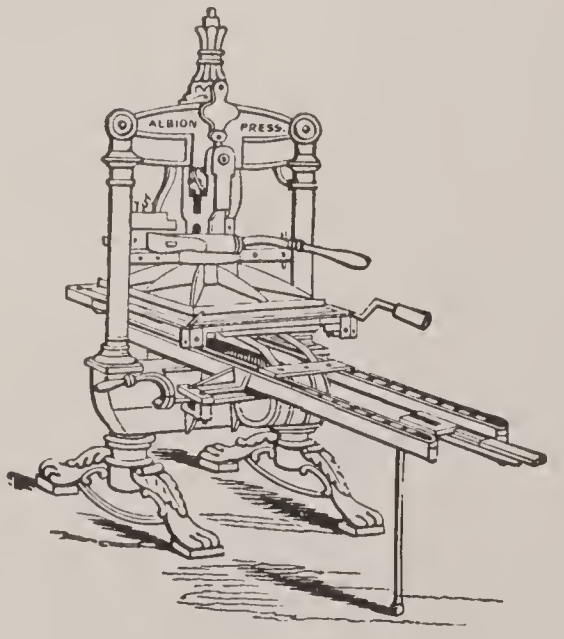
Single matrix. Double matrix.
a, letter mold. *o*, distribution teeth.

under them and receive ink in passing. In hand-printing the paper is placed and the pressure given by a second workman. In machine-work the sheet may be placed by an assistant, or taken in by the machine itself, or otherwise supplied by a continuous web from a reel.

These operations, purely mechanical, have, however, to be preceded by a stage of preparation called *making ready*, which calls for more or less skill and taste from the workman. His craft in plain work is to produce printed sheets the letters or reading on which shall be sharp yet solid, with the color or depth of black uniform all over the sheet, and each sheet uniform with the others which are to form the book. This is attained partly by properly regulating the supply of ink, but mainly by getting uniformity of pressure, as any portion of a sheet more firmly impressed than another will bring off more color. When there are illustrations in the forme the printer's craft is the reverse of this, for he seeks to give artistic effect to the pictures by all shades of color, from deep black in the shadows to the lightest tints in the skies. These effects are got entirely by variations in pressure, the dark parts being heavily pressed, while the paper barely touches the inked surface in the light tints.

Mechanism of Printing.— The mechanism of printing, at first of a very simple kind, has latterly attained to great perfection and efficiency. Three methods are followed for obtaining the impression which produces the printed sheet. The first and simplest is by the advance toward each other of two flat surfaces, one (the bed) carrying the type-forme, the other (the platen) carrying the blank sheet to be printed. The second is by the rotation of a cylinder above a type-table traveling backwards and forwards, the table being in contact with the cylinder in advancing and free in returning. The third and most recently adopted method is the contact of two cylinders revolving continuously in the same direction, one carrying the type-surface and the other bringing against it a continuous web of paper, which it afterwards cuts into sheets. Presses or machines of the first class are called *platen*, the second *cylinder*, and the third *rotary*.

The press used by Gutenberg was of a very rude description, the ink being applied by means of leather-covered balls stuffed with soft material, and having suitable handles, and the pressure being obtained by a screw which brought down a flat block or platen. The first improvement on this device seems to have been the construction of guides, enabling the type-forme to be run under the impressing surface and withdrawn with facility. Other necessities soon after arose, chiefly that of obtaining a rapid return of the platen from the position



Albion Press.

at which it gave the pressure without the screw requiring to be turned back; but it was not till the year 1620 that this was met by the invention of Willem Janszoon Blaeu, a native of Amsterdam. Charles Mahon, the third earl of Stanhope, was the author of the next great improvement in printing-presses, about

1800. He devised a combination of levers, which he applied to the old screw-press. These levers brought down the platen with greatly increased rapidity, and what was of still greater importance, converted at the proper moment that motion into direct pressure. The pressure was under control and capable of easy adjustment. The press was of iron, not of wood as was the case with all previously constructed presses, and it exhibited a number of contrivances of the most ingenious character for facilitating the work of the pressman. In 1813 John Ruthven, a printer of Edinburgh, patented a press on the lever principle, with several decided improvements. The Columbian Press, invented in 1814 by G. Clymer, of Philadelphia, and the Albion Press, were the latest contrivances. Even in its best form the hand-press is laborious to work and slow in operation, two workmen not being able to throw off more than 250 impressions in an hour. It therefore became imperative, especially for newspapers, to devise a more expeditious and at the same time a more easy method of taking impressions from types.

So early as the year 1790 Mr. Nicholson took out letters-patent for printing by machinery. His printing-machine never became available in practice, yet he deserves the credit of being the first who suggested the application of cylinders and inking-rollers. About ten years later König, a printer in Saxony, turned his attention to the improvement of the printing-press, with a view chiefly to accelerate its operation. Being unsuccessful in gaining assistance in his native country to bring his scheme into operation, he came to London in 1806. There he was received with equal coldness, but ultimately, with the assistance of Mr. Bensley, he constructed a machine on the platen or hand-press principle. Afterwards he adopted Nicholson's cylinder principle, and succeeded in producing a machine which so satisfied Mr. Walter, proprietor of the *Times* newspaper, that an agreement was entered into to erect two to print that journal. On the 28th of November, 1814, the reader of the *Times* was informed that he held in his hand a paper printed by machinery moved by the power of steam, and which had been produced at the rate of 1800 impressions per hour. This is commonly supposed to be the first specimen of printing executed by steam machinery; but König's platen machine was set to work in April, 1811, and 3000 sheets of signature H of the *Annual Register* for 1810 were printed by it. That was undoubtedly the first work printed by machinery.

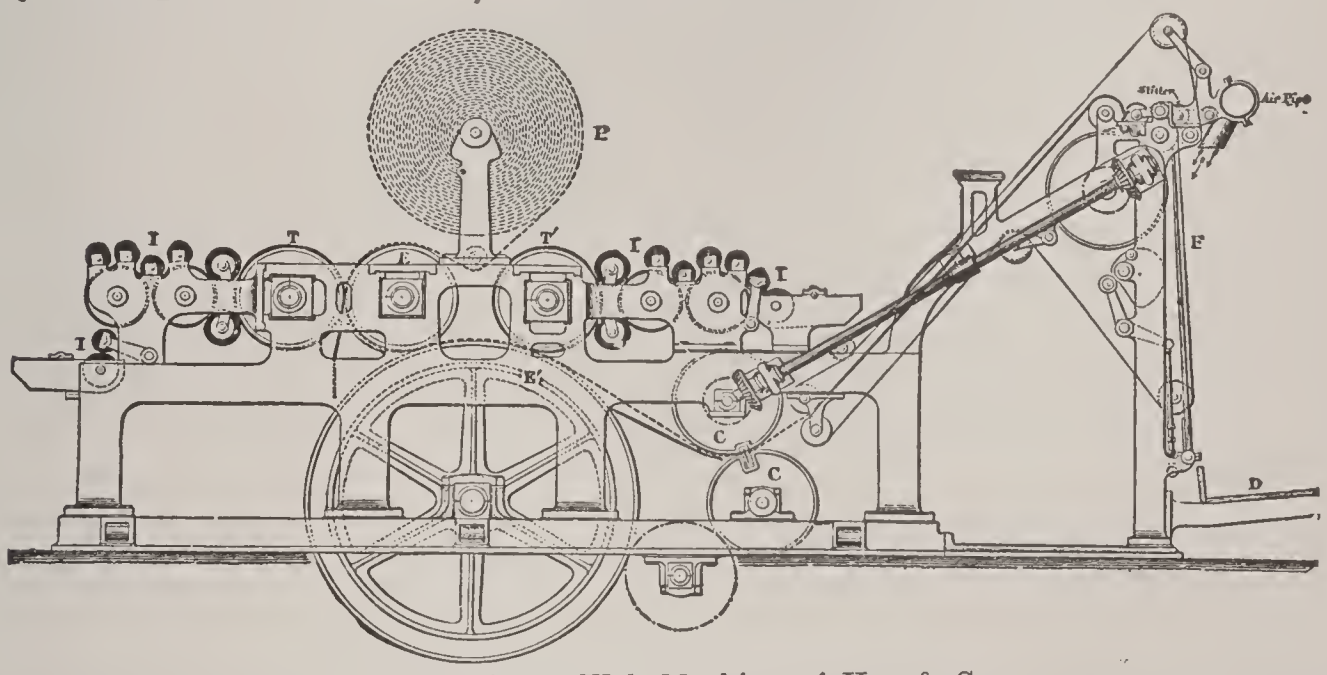
A further improvement was made in May, 1848, by Applegarth. His machine, which printed 10,000 impressions per hour, had a vertical cylinder 65 inches broad, on which the type was fixed, surrounded by eight other vertical cylinders, each about 13 inches diameter and covered with cloth, round which the paper was led by tapes, each paper or impression cylinder having a feeding apparatus and two boys tending. The type used was the ordinary kind, and the form was placed on a portion of the large cylinder. The surface of the type formed a portion of a polygon, and the regularity of the impression was obtained by pasting slips of paper on the impression cylinders.

Few machines, however, of this construction were made, a formidable rival having appeared, devised by Messrs. Hoe & Co., of New York. It was constructed with from two to ten impression cylinders, each of them printing from a set of types placed on a horizontal central cylinder of about 6½ feet in diameter, a portion of which was also used as a cylindrical ink-table, each of the encircling cylinders having its own inking rollers and separate feeder. A machine of this construction, having ten impression cylinders, threw off at the rate of 18,000 impressions an hour.

Repeated attempts were made by inventors to construct a machine which would print from the continuous roll or web in which paper is supplied by the paper-making machine. Experiments were conducted successfully by Nicholson, Stanhope, Sir Rowland Hill, Applegarth, and others, but the difficulties for the time proved insurmountable. These, however, were at length overcome, and the result is the construction of a class of machines which possess the merit of being at once simpler, more expeditious, and more economical in requiring less attendance than any previous contrivance.

The first machine on the web principle that established itself in the printing-office was the 'Bullock,' an American contrivance. It was, however, speedily eclipsed by the 'Walter Press,' invented and constructed on the premises of the *London Times*. Since then several other rotary machines have been invented and brought into extensive use. The 'open-delivery' machine (that is, unprovided with an apparatus for folding the papers) of the latter firm may be taken as a type of rotary machines, and is shown in the figure. The roll of paper P is placed im-

mediately above the type cylinders, which are fitted to a horizontal frame. The web is printed on one side by the forme on the cylinder T, then on the other on cylinder T′, and thence passes between two cutting cylinders C C which are of the same diameter as the printing cylinders. The sheets thus severed then travel upward over a drum, and when any desired number of sheets are gathered they are directed by a switch down the flyers F and deposited on the taking-off board D. E is the impression cylinder for the printing cylinder T, and E′ for T′. The cylinder E′ is made of large diameter in order that the blanket with which it is covered may absorb the surplus ink of the first-printed side of the web. The inking apparatus consists of two drums parallel to each other, each provided with the necessary inking-rollers I I. The producing power of this machine is from 12,000 to 15,000 perfect eight-page papers per hour. Machines of later origin very greatly surpass this in productive capacity, papers of 8 to 12 pages being printed at a speed of 24,000 per hour, and 4 to 6 page papers at 48,000 per hour.



Open-delivery Web Machine of Hoe & Co.

The machines hitherto described have been of the cylinder class and of the outcome of that class — the rotary. The *platen* or flat-surface printing-machine was contrived soon after the introduction of the cylinder, and had for its aim the production of work equal in quality to that produced by the hand-press, and at a greater speed. It is constructed upon the same principle as the hand-press so far as the mode of taking the impression is concerned, but is distinguished from that press in that it automatically inks the forme, runs in the carriage, brings down the platen and returns it, then runs out the carriage, the tympan being lifted by attendants, who remove the printed sheet, replace it with another, turn down the tympan, and leave the machine to go through its motions over again. The great improvements recently made on cylinder machines, especially of the 'French' class, having made them capable of producing book work of the finest quality, the use of the platen is now confined to special sorts of work.

Up to 1840 there was no press strong enough to print properly a wood cut of 48 square inches in size; now cuts of 2000 square inches, or 50 by 40 inches, are printed in the most perfect manner. The colored supplements of the pictorial journals are often admirable reproductions of works of high art.

Prior (prī′er), a title somewhat less dignified than that of abbot, formerly given to the head of a small monastery, designated a *priory*. Similarly the term *prioress* was applied to the head of a convent of females. See *Abbey*.

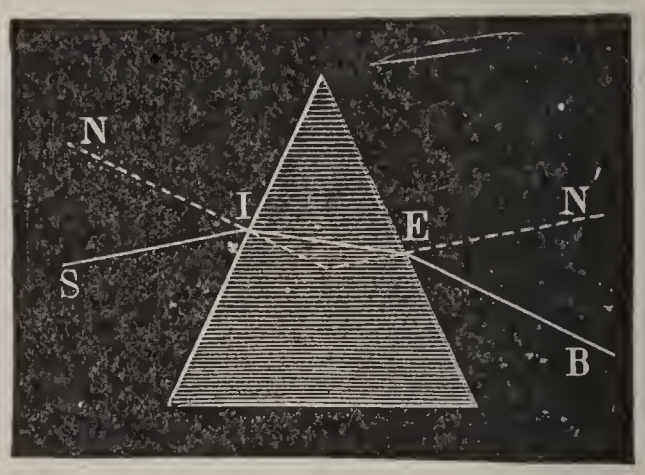
Prior, MATTHEW, an English poet, the son of a joiner, born in 1644, and educated at Westminster School. He early found a patron in the Earl of Dorset, through whose good offices he was enabled to enter, in 1682, St. John's College, Cambridge, where he was graduated as B.A. in 1686, and was shortly after chosen fellow. At college he contracted an intimacy with Charles Montagu, afterwards Earl of Halifax, in concert with whom, in 1687, he composed the *Country Mouse and City Mouse* — a parody on Dryden's *Hind and Panther*. This work

brought him into fame, and in 1690 he was appointed secretary to the English embassy at The Hague. In 1697 he was nominated secretary to the plenipotentiaries who concluded the Peace of Ryswick, and on his return was made secretary to the lord-lieutenant of Ireland. In 1701 he entered Parliament as a Whig, but soon after changed his politics and joined the Tory party. He was in consequence excluded from office during the régime of Marlborough and Godolphin, and he employed himself in writing and publishing another volume of poems. In 1711, when the Tories again obtained the ascendency, he was employed in secretly negotiating at Paris the terms of the Treaty of Utrecht, and he remained in France until 1714, at first as a secret agent, afterwards as ambassador. On the accession of George I, when the Whigs were once more in power, Prior was recalled and examined before the privy-council in respect to his share in negotiating the Treaty of Utrecht, and was kept in custody on a charge of high treason for two years, although ultimately discharged without trial. During his imprisonment he wrote *Alma, or the Progress of the Mind*, which, together with his most ambitious work, *Solomon*, was published in 1718. He died in 1721 and was buried in Westminster Abbey. Prior was endowed with much wit and power of satire; and many of his lighter pieces are charming, but his serious performances fail in moving either the feelings or the fancy.

Priscianus (prish'i-an-us), usually known as PRISCIAN, a celebrated Roman grammarian, who lived in the latter half of the fifth century of our era, and of whom little more is known than that he was born at Cæsarea, taught grammar at Constantinople in the time of Justinian, and wrote the *Institutiones Grammaticæ*, an exposition of Latin grammar. His work, successively abridged by several writers, formed the basis of instruction in Latin up to the fifteenth century, and there exist at present about one thousand MSS. of it, none dating before the ninth century. It contains numerous quotations from Latin authors now lost.

Priscillian (pris-il'i-an), the founder of a sect in Spain, known as Priscillianists, in the middle of the fourth century, their doctrines being a mixture of Gnosticism and Manichæism. Priscillian was himself a wealthy and accomplished man, of very temperate and strenuous habits. His followers did not leave the Catholic Church, and he was actually at one time made a bishop himself. He was ultimately executed at Treves in 385, after a prolonged struggle with the orthodox clergy. The most distinctive part of his creed was the belief in an evil spirit as the supreme power. His sect lasted until about 600 A.D.

Prism (prizm), in geometry, a solid figure which might be generated by the motion of a line kept parallel to itself, one extremity of it being carried round a rectilinear figure. A 'right prism' is one in which the faces are at right angles to the ends. In optics a prism is a transparent body having two plane faces not parallel to one another, and most commonly it is made of glass, and triangular in section, the section forming either a right-angled, equilateral, or isosceles triangle. The two latter



Light passing through Prism.

varieties are most familiar. If a ray of light, SI, enter such a prism by one of the two principal faces, it is bent in passing through so as to take the direction by SIEB. The angle which the ray in the prism makes with the normal, NI, is always smaller than the angle of incidence, NIS, and the angle which it makes with the normal, EN', is smaller than the angle of emergence, N'EB, the ray being always bent towards the base of the prism. Not only is the ray thus bent, but it is also decomposed, and by suitable arrangements could be exhibited as made up of what are usually known as the seven primary colors: violet, indigo, blue, green, yellow, orange, and red. See *Color*, *Light*, *Optics*, *Spectrum*.

Prison (priz'n), a house in which a person is confined and thereby deprived of his personal liberty; especially a building for the confinement or safe custody of criminals, debtors, or others. Imprisonment is now one of the recognized methods of judicially punishing certain crimes; but formerly it was employed in nearly every coun-

try in Europe for purposes of injustice and oppression. Men were hidden in dark dungeons, where in a short time they perished, through the inefficiency of the law to protect those who were offensive to the powerful; and even in Great Britain, where the laws have always condemned the incarceration of the innocent, the prison was, by the connivance of the authorities, made subservient to gross injustice and cruelty. To the eighteenth century belongs the honor of initiating the proper regulation of imprisonment. In Britain parliamentary inquiries brought out strange revelations as to the horrors of the debtors' prisons; but public interest in the subject was only effectually aroused by the extraordinary exertions of the celebrated John Howard, who in 1773 began, without any official standing, to make inspections of the chief English prisons. He found these places not only insanitary and ill ventilated, but filthy, poisonous, and in nearly every case overcrowded. Disease was rampant, and no measures were taken to prevent its spread; many of the prisons were utterly unfit for human creatures to live in; and, to crown all, such intercourse was allowed between the prisoners as ensured the reduction of all to the level of the most corrupt and criminal. Howard's revelations caused such a feeling throughout the country that prison reformation could no longer be delayed. The result was that parliament entrusted a committee of three (of whom Howard was one) with the duty of framing a suitable scheme for the future management of the prisons. Their recommendations were embodied in the Act 19, Geo. III c. 74 (1779), which sets forth distinctly the principles that were to govern future prison discipline in Britain. The chief features emphasized are — solitary confinement, cleanliness, medical help, regular work, and the enforcement of order — the same principles, indeed, which are now adopted by every civilized state in the world. Up almost to this time many criminals had been sent as convicts to America; but this being no longer possible, the new scheme was intended to provide accommodation for such at home. Australia, however, now presented itself as a new field for transportation, and the legislature hailed with joy this new receptacle for criminals. The newborn zeal of the public died out with the absence of any need for change, and the whole scheme dropped for eleven years, to be revived again by the earnest enthusiasm of a single individual. In 1791 Bentham published a work, in which he constructed (on paper) a model prison, which he called the *Panopticon*. Next year he proposed himself to construct the building in reality. His ideal prison was not unlike Howard's; but Bentham trusted greatly to publicity and free communication between criminals and the public for the protection of the inmates from oppression. In 1794 the government adopted his scheme, but the construction of the prison was put off till 1810, when Sir Samuel Romilly moved Parliament to take up the matter once more. This time it was pushed to a successful issue; and in 1811 was erected the famous penitentiary of Millbank, virtually on Howard's plans, and destined to be the precursor of the modern prison. This was only the beginning of reform, and the credit of carrying it on is largely due to the Prison Discipline Society, and to Mr. Buxton and Mrs. Fry, its leading members. The latter began her work at Newgate in 1813, and found that prison in a state as bad as can be imagined. Among the prisoners themselves she effected a reformation, perhaps only temporary; but among the public her efforts inaugurated a desire for improvement which resulted in the abolition of all such scandals. In 1824 and 1825 the legislature passed important acts for the regulation of prisons, containing provisions for moral and sanitary care of prisoners, separation of the sexes, etc. The use of irons was partially forbidden, and separate cells for each prisoner recommended. These laws, though not carried out to the letter at first, were very helpful to future reformers. In 1831 a committee of the House of Commons reported in favor of separate cells in all cases, and this suggestion was adopted. The gradual work of modernizing prisons then went on until the cessation of transportation to New South Wales in 1840 and the general defects of this system rendered it necessary to look out for new ways of disposing of the criminal population. The chief features of the new scheme now brought into operation consisted of the following: (1) Separate confinement in a penitentiary for a short period; (2) hard prison labor in some public work; and (3) transportation with ticket-of-leave. For the first of these forms of punishment the existing prisons were used; for the second, which really came in place of the former system of wholesale transportation, public work was found at Portland, Dartmoor, and Portsmouth. The third was not successful. The colonies refused to receive the ticket-of-leave

men, and these had ultimately to be liberated at home. At present the system of imprisonment in Britain stands thus: When the convict is sentenced for a period of two years or less, the punishment is technically termed imprisonment. The criminal passes the time in a local prison, where he lives in solitary confinement and works at the tread-wheel for a month; if his conduct is good he receives marks which entitle him to improved conditions as the close of his term approaches. Penal servitude is the title applied to terms of imprisonment which exceed two years. It is passed in a convict prison, and is divided into three periods. The first lasts nine months, is one of solitary confinement, and during it the convict is set to work at some industry. The second period is also distinguished by cellular isolation, but the convict works along with others at one of the great convict prisons, such as Portland or Dartmoor. The final period is that of release on ticket-of-leave, during which the convict is obliged to report himself at intervals to the police.

In the United States prison horrors in the early days differed only from those of the mother country in the fact that prisons were rare. Connecticut for more than fifty years had an underground prison in an old mining pit. In Philadelphia all grades of criminals and both sexes were huddled together. In Boston debtors were confined with criminals in common night-rooms. Every village had its stocks, pillory, and whipping-post. Reform began in Philadelphia, where in 1776 was formed 'The Society for Alleviating the Miseries of Public Prisons.' The Boston 'Prison Discipline Society' of 1824, and the 'Prison Association of New York,' organized later, are still active. The 'National Prison Association of America' was formed in 1870, now one of the most efficient in the world. Prison reform congresses have been held in all large cities, where the humanitarian influences of state officials have been unified in one body. One of the misfortunes of the prison systems in many of the States is a disposition to regard convicts as slaves of the state, the profit of whose labor is so much clear gain to the state treasury. Competition with labor outside the prison walls being thus forced, troubles have ensued of great peril — as in Tennessee in 1890-93 among iron and coal miners, and in other Southern and Western States. In some of these States the convicts are made to perform outdoor labor and at times hired out to contractors by whom they are often treated very harshly and cruelly. The evils of this system have of late been made evident, and earnest efforts to reform or do away with the system are being made. See also *Punishment.*

Privateer, a vessel of war owned and equipped by private individuals to seize or plunder the ships of an enemy. Such a vessel must be licensed by government and under a letter of marque, otherwise she is a pirate. The letters of marque were first granted in England during the reign of Henry V, in view of the war with France; and they were issued to aggrieved subjects in order that they might compensate themselves for injury done by foreigners. In the sixteenth century it became common to grant commissions to privateers. England, Holland, and Spain, as the three principal naval powers, used this effective weapon freely; and France also sent out privateers in every war in which she was engaged. A neutral is not forbidden by the law of nations to accept a commission for privateering; but he may be, and generally is, by treaty. In 1818 Congress passed a law forbidding enlistments on foreign privateers. By the Declaration of Paris, 1856, the great powers of Europe mutually agreed to abandon the right to arm privateers in case of war; but several nations, chief of them being the United States and Spain, have not agreed to this, and it is doubtful whether it will be always strictly acted upon even by the parties to the declaration. The German volunteer fleet of 1870 can not be very clearly distinguished from a collection of privateers. The practice of privateering, while useful to maritime countries, and necessary at one period to England, is very harassing to trade, and gives endless opportunities for private plunder. It was probably in deprecation of irresponsible warfare of any kind that the powers agreed to abandon privateering in 1856. At the Hague Conference of 1907, the question of privateering was considered, and strict precautions taken against the revival of this practice in naval war, by insisting that when merchant vessels are converted into cruisers they shall be formally enrolled on the naval list and placed under the command of a commissioned naval officer, with a crew subject to naval discipline.

Privet (priv'et; *Ligustrum*), a genus of plants of the order Oleaceæ. The common privet (*L. vulgāre*) is a native of Europe, growing 8 or 10 feet high; the leaves are elliptico-lanceolate, entire, and smooth; the flowers slightly odorous, white at first, but soon chang-

ing to a reddish brown; and the berries dark purple, approaching black. This species is much used in English gardens for ornamental hedges. It is found in woods from Virginia to Mississippi, and is now widely used for hedges and other ornamental purposes in the United States. There are numerous other species.

Privilege (priv′i-lij; Latin, *privilegium*), a particular exemption from the general rules of law. This exemption may be either *real* or *personal:* real, when it attaches to any place; personal, when it attaches to persons, as ambassadors, members of Congress, clergymen, lawyers, and others. Real privilege is now of little importance; personal privilege, however, is guaranteed to many individuals. Suitors and counsels are exempt from arrest while in court; and Congressmen while in attendance in and going and returning from their respective Houses.

Privileged Communication.

See *Confidential Communication.*

Privy-chamber, GENTLEMEN OF THE, officers of the royal household of England, instituted by Henry VII. Their duties are to attend the sovereign; but their appointment is now merely a mark of honor, neither service nor salary being attached to their posts.

Privy-council, the council of state of the British sovereign, convened to concert matters for the public service, and for the honor and safety of the realm. The English privy-council may be said to have existed from times of great antiquity; but the *concilium ordinarium*, established by Edward I, was the parent of the modern institution. It consisted of the chief ministers, judges, and officers of state, and grew in power and influence rapidly, though repeatedly checked by jealous Parliaments. Since the time of the Long Parliament the power of the council has been much reduced, and the rise of the cabinet has effectually blotted out all the more important functions of the earlier body. The privy-council of Scotland was absorbed in that of England at the union; but Ireland has a special privy-council still. As it exists at present, the number of members of the privy-council is indefinite; they are nominated by the sovereign at pleasure, and no patent or grant is necessary, but they must be natural-born subjects. The list of privy-councilors (some 200 in number) now embraces, besides the members of the royal family and the members of the cabinet, the archbishops and the Bishop of London, the great officers of state, the lord-chancellor and chief judges, the speaker of the House of Commons, the commander-in-chief; and other persons who fill or have filled responsible offices under the crown, as well as some who may not have filled any important office. Officially at the head is the lord-president of the council, who is appointed by patent, and who manages the debates and reports results to the sovereign. A member of the privy-council has the title of 'right honorable.' It is only on very extraordinary occasions that all the members attend the council, and it is not now usual for any member to attend unless specially summoned. The attendance of at least six members is necessary to constitute a council. Privy-councilors are by their oath bound to advise the crown without partiality, affection, or dread; to keep its counsel secret, to avoid corruption, and to assist in the execution of what is resolved upon. While the political importance of the privy-council, once very great, has been extinguished by the growth of the system of party government, it still retains functions both administrative and judicial.

Orders in council are orders issued by the sovereign, by and with the advice of the privy-council, either by virtue of the royal prerogative, and independently of any act of Parliament, or by virtue of such act, authorizing the sovereign in council to modify or dispense with certain statutory provisions which it may be expedient in particular conjunctures to alter or suspend.

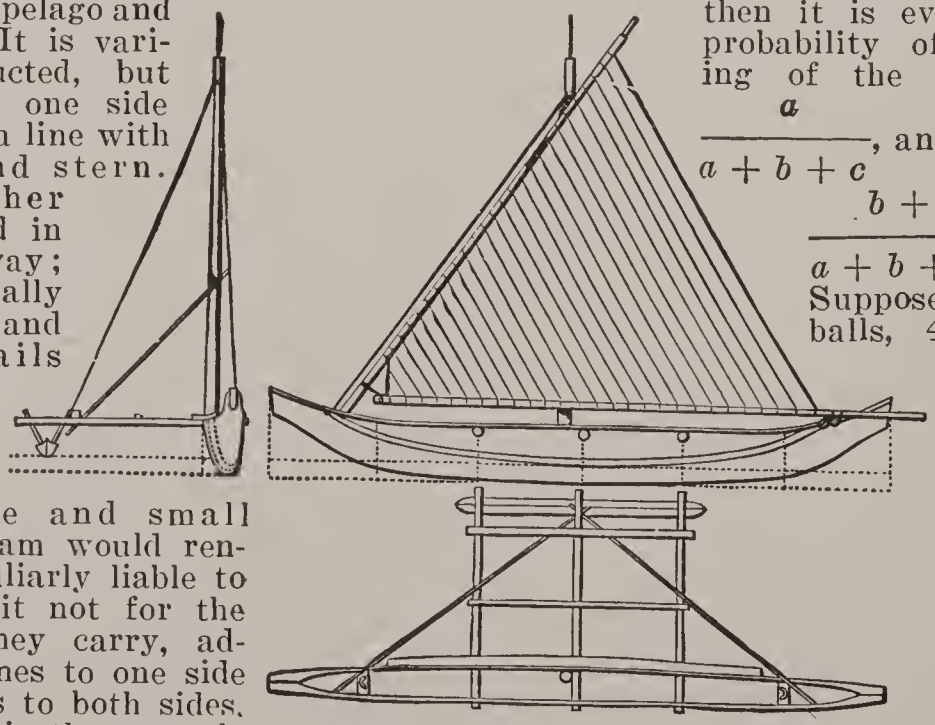
Privy-purse, KEEPER OF THE, an officer of the royal household of Great Britain, whose function it is to take charge of the payment of the private expenses and charities of the sovereign.

Privy-seal, a seal appended by the British sovereign to such grants or documents as are afterwards to pass the great seal. Since the time of Henry VIII the privy-seal has been the warrant of the legality of grants from the crown, and the authority for the lord-chancellor to affix the great seal; such grants are termed letters-patent. The officer who has the custody of the privy-seal is called lord privy-seal, and is the fifth great officer of state, having also generally a seat in the cabinet.

Prize (prīz), anything captured in virtue of the rights of war. Property captured on land is usually called *booty*, the term prize being more particularly used with reference to naval captures. The right of belligerents to

capture the property of their enemies on the sea is universally admitted, as well as the right to prevent violation of the law of nations by neutrals, so long as the independence of other nations is not interfered with. It is accordingly settled as a principle of the law of nations that every belligerent has a right to establish tribunals of prize, and to examine and decide upon all maritime captures; and likewise that the courts of prize of the captors have exclusive jurisdiction over all matters relating to captures made under the authority of their sovereign; excepting only in cases where the capture was made upon the territory of a neutral, or by vessels fitted out within a neutral's limits. These cases involve an invasion of the neutral's sovereignty, and must be adjudicated in his court. The decisions of the prize courts are final and conclusive upon the rights of property involved; and if their judgments work injustice to the subjects of other powers their claims must be adjusted between the sovereigns of their respective states. At the Hague Conference of 1907 the formation of an International Prize Court was proposed by the American delegates and adopted by the congress. This was the most important result of the Conference, though it has not been as yet accepted by the powers. Much consideration was given to the rights of neutrals in case of war and while no definite agreement was reached, the feeling was in favor of more just and civilized methods than have heretofore prevailed.

Proa (prō'a), a peculiar kind of sailing-boat used in the Malay or Eastern Archipelago and the Pacific. It is variously constructed, but regularly has one side quite flat, on a line with the stem and stern, while the other side is curved in the usual way; and being equally sharp at stem and stern, it sails equally well in either direction without turning. Their shape and small breadth of beam would render them peculiarly liable to overset were it not for the outrigger they carry, adjusted sometimes to one side and sometimes to both sides. The outrigger in the example here shown is a large structure supported by and formed of stout timbers. The outrigger may have weights placed on it and adjusted according to circumstances. Proas carry a lugsail generally of matting.



Plan, Elevation, and End View of Proa.

Probabilists (prob'a-bil-istz), a name applied to those philosophers who maintain that certainty is impossible, and that we must be satisfied with what is probable. This was the doctrine of the New Academy at Athens, particularly of Arcesilaus and Carneades.

Probability (prob-a-bil'i-ti), in algebra, the mathematical investigation of chances; the ratio of the number of chances by which an event may happen to the number by which it may both happen or fail. If an event may happen in a ways and fail in b ways, and all these ways are equally likely to occur, the probability of its happening is $\frac{a}{a+b}$, and the probability of its failing is $\frac{a}{a+b}$, 'certainty' being represented by unity. When the probability of the happening of an event is to the probability of its failing as a to b, the fact is expressed in popular language thus — the 'odds' are a to b for the event, or b to a against the event. If there are three events such that one must happen, and only one can happen, and suppose the first event can happen in a ways, the second in b ways, and the third in c ways, and that all these ways are equally likely to occur, then it is evident that the probability of the happening of the first event is $\frac{a}{a+b+c}$, and of its failing $\frac{b+c}{a+b+c}$. Example: Suppose that 3 white balls, 4 black balls, and 5 red balls are thrown promiscuously into a bag, and a person draws out one of them; the probability that this will be white is $\frac{3}{12}$ or $\frac{1}{4}$, the probability that it will be

black is $\frac{4}{12}$ or $\frac{1}{3}$, the probability that it will be red is $\frac{5}{12}$. The theory of probabilities is a complicated and extensive one, and has been much utilized in actuarial science; it has also been used in calculating the chances at various games.

Probate (prō′bat), the proof before an officer authorized by law that an instrument offered to be proved or recorded is the last will and testament of the deceased person whose testamentary act it is alleged to be. In a trial at common law, or in equity, the probate of a will is not admissible as evidence, but the original will must be produced and proved the same as any other disputed instrument. This rule has been modified by statutes in some of the United States. The proof of the will is a judicial proceeding, and the probate a judicial act. The party propounding the instrument is termed the proponent, and the party disputing, the contestant. In the United States, generally speaking, proofs cannot be taken until citation or notice has been issued by the judges to all the parties interested to attend. On the return of the citation, the witnesses are examined, and the trial proceeds before the court. If the judge, when both parties have been heard, decides in favor of the will, he admits it to *probate;* if against the will, he rejects it, and pronounces sentence of *intestacy.* The Court of Probate, in England, was established by act of Parliament in 1857; afterwards merged in the Supreme Court, by the Judicature Act of 1874, by which its jurisdiction was assigned to a Probate, Divorce, and Admiralty Division. The functions of this branch are confined to deciding on the authenticity of wills and upon the proper persons to act as administrators when no will exists. The practice of the court is thrown open to the whole legal profession.

Proboscidea (pro-bo-sid′e-a), an order of mammals distinguished, as implied by this name, by the possession of the characteristic proboscis or trunk. Of this class the elephant alone exists; but there are several extinct animals comprised in it, such as the mammoth and the mastodon.

Proboscis (pro-bos′is), the term applied to the longer or shorter flexible muscular organ formed by the elongated nose of several mammals. Although seen in a modified degree in the tapirs, etc., the term is more generally restricted and applied to indicate the flexible 'trunk' of the elephant. See *Elephant.*

Proboscis Monkey, or KAHAU (*Presbȳtes nasālis*), a native of Borneo, distinguished particularly by its elongated nose, its shortened thumbs, and its elongated tail. The general color is a lightish red. These monkeys are arboreal in habits, and appear to frequent the neighborhood of streams and rivers, congregating in troops.

Probus (prō′bus), MARCUS AURELIUS, one of the ablest of the Roman emperors, was born at Sirmium in the year 232. At an early age Marcus attracted the notice of the Emperor Valerian, by whom, after having distinguished himself by military service, he was placed at the head of a legion; and the brilliancy of his subsequent conduct in the African, Persian, Arabian and Germanic campaigns brought him into still more prominent notice. On the death of the Emperor Tacitus, in 276, the army hailed him as emperor, a selection immediately confirmed by the senate and people of Rome. His chief struggle during his reign was to guard the frontiers of the empire against the barbarians, a task which he carried out with great success both in Europe, Asia, and Africa. He also settled large numbers of barbarians in the frontier provinces, and admitted them to his legions; and devoted himself to the making of roads and draining of marshes. His skilful administration and public virtues did not, however, protect him from enmity; and after a short reign he was murdered in a military insurrection in 282.

Procédure (prō-sē′dūr), CIVIL, is the method of proceeding in a civil suit throughout its various stages. In the United States, when redress is sought for a civil injury, the injured party brings an *action* against the party whom he alleges has done the injury. The person who raises an action is termed the *plaintiff*, and he against whom the action is brought the *defendant;* in Scotland the terms are *pursuer* and *defender.* It is usual before the suit is commenced for the plaintiff's attorney to acquaint the defendant with the demand of his client, and state that unless complied with legal proceedings will be instituted. Should this not have the desired effect, the action is begun as a rule by issuing against the defendant a *writ of summons*, commanding him to enter *an appearance* in court, failing which an appearance will be entered for him by the plaintiff. (See *Non-appearance.*) When an appearance has been entered both parties to the suit are now said to be *in court*, and judgment may be proceeded with. The next stage is the *pleadings* or the statements in legal form of the

cause of action or ground of defense brought forward by the respective sides. The next stage of precedure after the pleadings is the *issue*, which may be either on matter of law, when it is called a *demurrer*, or on matter of fact, where the fact only is disputed. A demurrer is determined by the judges after hearing argument on both sides, but an issue of fact has to be investigated before a jury, and this is denominated *trial by jury*. (See *Jury and Jury Trials.*) After the judge has summed up to the jury the *verdict* follows and then the *judgment* of the court; where there is no jury, of course, judgment is pronounced by the judge after hearing counsel.

Procellaridæ (pro-sel-lar'i-dē), the petrel family of birds, of which the typical genus is *Procellaria*.

Process (prō'ses), in law, a term applied in its widest sense to the whole course of proceedings in a cause real or personal, civil or criminal.

Processional (prō-sesh'un-al), a service-book of the Roman Catholic Church, for use in religious processions. Some of the processionals of ancient date are very rare and highly valued by book-fanciers.

Procession of the Holy Ghost. See *Holy Ghost.*

Procida (pro'chi-dȧ; anciently, *Prochyta*), an island on the west coast of S. Italy, lying nearly midway between the island of Ischia and the coast of the province of Naples. It is about 3 miles long and 1 mile broad, flat in surface, and fertile. The principal place of the island is Procida, or Castello di Procida, which has a harbor, a castle, and a considerable trade. Pop. 13,964.

Procida, Giovanni da. See *Sicilian Vespers.*

Proclamation (prok-la-mā'shun), a public notice made by a ruler or chief magistrate to the people, concerning any matter which he thinks fit to give notice about. It may consist of an authoritative announcement of some great event affecting the State, but is most commonly used in Britain for the summoning, prorogation, and dissolution of Parliament. A royal proclamation must be issued under the great seal. In the United States the President issues proclamations as to treaties, days of thanksgiving, admission of new States, etc. Proclamations are issued in the United States for election days, the President, Governors, mayors, and sheriffs acting by authority of their offices.

Proclus (prō'klus), a philosopher of the Neo-Platonic school, born at Byzantium in 412; died at Athens in 485. He was educated at Alexandria and Athens and became familiar with all branches of philosophy and theology. As a teacher at Athens he was very successful. His system aimed at the widest comprehensiveness. He not only endeavored to unite all philosophical schemes, but made it a maxim that a philosopher should embrace also all religions by becoming infused with their spirit. In his writings he professes to return to Plato, and to bring down Neo-Platonism from the misty heights to which it was raised by Plotinus. M. Cousin placed him on a level with the most distinguished philosophers of Greece, but this estimate is generally considered extravagant. His extant works include a *Sketch of Astronomy*, in which he gave a short view of the systems of Hipparchus, Aristarchus, and Ptolemy; *The Theology of Plato*, *Prineiples of Theology*, a *Life of Homer*, etc.

Proconsul and Proprætor, originally, in the ancient Roman system of administration, a consul or prætor whose command (or *imperium*) was prolonged for a particular purpose after his demission of office. In course of time the terms came to be applied to anyone who was entrusted with some special service, and with magisterial authority for the purpose of performing it. Proconsuls and proprætors were generally men who had been consuls or prætors, but were not always so. There were four varieties of proconsul: 1. A distinguished statesman, formerly consul, appointed for a special duty. 2. An individual, who had never been consul, was sometimes created proconsul to be sent on some important mission. 3. A consul occasionally had his *imperium* prolonged, in order to complete some undertaking he had commenced. 4. A consul appointed after his term of office to the government of a province. The proconsuls under the republic had no authority within the walls of Rome, and they lost their *imperium* on entering the city. Under the empire the emperor was always invested with proconsular authority.

Procopius (pro-kō'pi-us), Andrew, a Hussite leader of the fifteenth century. He succeeded Ziska in 1424 as commander of the Taborites, the chief section of the Hussites, and became the dread of the troops of the Emperor Sigismund. He made himself master of a large part of Bohemia, and ravaged Moravia, Austria, and Silesia. His principal military triumphs were the battle of Aussig in 1426, and his campaigns in

Silesia and Saxony in the following year. His expeditions were marked with great courage and slaughter, and with the destruction of many cities, of which Dresden was the chief. In 1431 he gained a great victory over the Elector of Brandenburg, who was in alliance with Sigismund, and in 1433 he appeared with a large following at the Council of Basel, and demanded, in the name of the Hussites, various reforms in religious matters. As the section of the Hussites led by Procopius were not satisfied with the concessions made by the council war was resumed, but Procopius was killed soon after in a battle fought at Böhmischbrod (1434).

Procopius of Cæsarea, a Greek historian, a native of Cæsarea, in Palestine, where he is supposed to have been born about 500 A.D. He first attracted the notice of Belisarius, who appointed him his secretary; and about the year 541 he was appointed by the Emperor Justinian a senator and afterwards (562) prefect of the city. He died at Constantinople about 565 A.D. His works are a history of his own times and a history of the edifices built or repaired by Justinian. A scandalous chronicle of the court of Justinian, entitled *Anecdota*, has also been attributed to him by some writers.

Procrustes (pro-krus'tēz; 'the Stretcher'), a celebrated robber of ancient Greek legend, whose bed is still proverbially spoken of. The legend of him is, that if his victims were too short for the bed, he stretched them to death, while, if they were too tall, he cut off their feet or legs.

Procter (prok'tėr), Bryan Waller, an English poet and prose writer, born about 1789; died at London in 1874. He was educated at Harrow, where he was the schoolfellow of Byron and Peel. His first published work was entitled *Dramatic Scenes and other Poems*, and appeared in 1819 under the pseudonym of Barry Cornwall, which remained Procter's pseudonym in his future writings. This volume being well received, he published shortly thereafter *A Sicilian Story* and *Marcian Colonna*. In 1821 he produced a tragedy, *Mirandola*, which was performed with great success at Covent Garden. Procter also wrote several other books of poetry and a variety of prose works; the most interesting of these latter being a *Memoir of Charles Lamb*, of whom he was an intimate personal friend. Procter's poems exhibit much delicate grace and refinement, but have never attained great popularity. He was called to the bar in 1831, and for many years held the post of a commissioner in lunacy, which, however, he resigned in 1860.— His daughter, Adelaide Anne, born in London in 1825; died in 1864, was a poetess of some note. Her songs and hymns show much taste and feeling, but she never attempted anything on a large scale. Her best-known volume is *Legends and Lyrics*, published in 1858.

Proctor (from the Latin *procurator*), a person who in the ecclesiastical and admiralty courts in England performs the duties of an attorney or solicitor. The proctors were formerly a distinct body, but any solicitor may now practice in these courts. The queen's proctor is a crown official charged with the duty of conserving the public interests in certain classes of private lawsuits. In the Universities of Oxford and Cambridge the proctors are two officers chosen from among the masters of art, whose office is to preserve discipline.

Proctor, Redfield, statesman, was born at Proctorsville, Vermont, in 1831; died in 1908. He was elected to the legislature of Vermont in 1867, lieutenant-governor in 1876, and governor in 1878. He was made Secretary of War by President Harrison in 1889, and was elected United States Senator for Vermont in 1891.

Proctor, Richard Anthony, an English astronomer, born at Chelsea in 1837, and educated at King's College, London, and Cambridge University. Having devoted himself specially to the study of astronomy, he published a number of valuable works on the subject, including *Saturn and its System*, *Handbook of the Stars*, *Half Hours with the Telescope*, *Half Hours with the Stars*, *Other Worlds than Ours* (a very popular work), *Light Science for Leisure Hours*, etc. He died in 1888, in the United States. In 1893 a monument was erected to his memory by George W. Childs in Greenwood Cemetery.

Procurator (prok'ū-rā-tur), among the ancient Romans, a provincial officer who managed the revenue of his province. In some of the small provinces, or in a part of a large province, the procurator discharged the office of a governor, and had the power of punishing capitally, as was the case with Pontius Pilate in Judæa, which was attached to the province of Syria.

Procurator-fiscal, in Scotland, an officer appointed to act as the public prosecutor in criminal cases before the sheriff, magistrates, or justices of the peace belonging to his district. He is allowed to practice privately as a lawyer also. When infor-

mation of a crime committed within a procurator-fiscal's district has been laid before him, it is his business to ascertain the truth of the charge, to obtain a warrant for the apprehension of the accused, to see that the warrant is carried out, and in general to do whatever else is necessary to protect the innocent, and bring to justice the guilty. All precognitions of witnesses are taken by him before the sheriff or sheriff-substitute of the district. The procurator-fiscal has also, in conjunction with the sheriff, to discharge the duties of a coroner in making investigations with regard to persons who are suspected to have died from other than natural causes. The duties are somewhat similar to those of district attorneys in the United States.

Procyon (prō′si-on), the genus of animals to which the raccoon belongs.

Producer-gas (prō-dū′sėr). When a limited stream of air is driven through glowing coke, carbonic acid gas first arises from the coke, the oxygen of the air being consumed. As this passes through the coke it takes up new carbon and is largely converted into carbonic oxide. There results a gaseous mixture composed of about 26 per cent. of carbonic oxide, 70 per cent. of nitrogen from the air employed, and 4 per cent. of carbonic acid. This mixture is combustible, burning with a clear flame, and under the name of producer-gas is largely employed in various processes. The gas from the producer is very hot, and if passed at once into the furnace a large proportion of the heat of the coke may be utilized; if allowed to cool, a large percentage of the heat is lost. Coal yields about 160,000, coke about 175,000 cubic feet of this gas per ton. If steam be mixed with the air driven through the coke hydrogen is added to the gases produced, and the heating value is higher than in the former case.

Production, Cost of, a phrase used in political economy, not always in the same sense even by the same writer. The confusion generally arises from a want of clearness in distinguishing between cost and expenses of production. The cost of production in its original meaning signifies the amount of inconveniences and exertions necessary for the production of any commodity. Used as equivalent to expenses of production, it signifies the wages and profits expended on the production of the article. It is the ultimate basis of value of articles which can be indefinitely multiplied, and regulates the minimum value of articles which are limited in quantity.

Profession (pro-fesh′un), the act of taking the vows by the member of a religious order after the novitiate is finished. See *Monastic Vows.*

Professor (pro-fes′ur), a term applied in the United States to salaried teachers in universities and similar institutions who are appointed to deliver lectures for the instruction of students in some particular branch of learning. In Oxford and Cambridge, England, the professors, and the instruction which they convey by lectures, are only auxiliaries instead of principals, the necessary business of instruction being carried on by the tutors connected with the several colleges. In the universities of Scotland and Germany, on the other hand, the professors are at once the governing body and the sole recognized functionaries for the purposes of education.

Profit (prof′it), the gain resulting to the owner of capital from its employment in buying and selling, in manufacturing, or in any commercial undertaking.— *Net profit* is the difference in favor of a seller between the selling price of commodities and the original cost after deducting all charges.— The *rate of profit* is the proportion which the amount of profit derived from an undertaking bears to the capital employed in it.— *Profit and loss*, the gain or loss arising from goods bought or sold, or from any other contingency. In *bookkeeping* both gains and losses are titled *profit and loss*, but the distinction is made by placing the former on the creditor side, and the latter on the debtor side.

Profit-sharing, a system now adopted in many manufacturing and mercantile establishments, by which a certain percentage of the annual profits is divided among the employés. It is argued that this system, by giving the employés an interest in the prosperity of the establishment, increases the quality and quantity of the product, and lessens the danger of strikes and labor disputes generally While recognized as a desirable principle by Targat in 1775, it was first put in practical operation in 1842 by Leclaire, a prosperous painter and decorator of Paris. It proved in his case highly successful, and also in several other French establishments. Of recent years it has been somewhat widely adopted in the United States, Great Britain, France, Switzerland and elsewhere, and has proved as a rule very advantageous.

Prognathic (prog-nath′ik), or Prognathous, in ethnology, a term applied to the skull of certain races of men in whom the jaw slants

forwards by reason of the oblique insertion of the teeth. See *Facial Angle.*

Prognosis (prog-nō'sis), in medicine, the prejudgment of the physician regarding the probable course and result of a disease.

Progression (pro-gresh'un), in mathematics, a regular or proportional advance in increase or decrease of numbers. In *arithmetical progression* terms increase or decrease by equal differences, as, 2, 4, 6, 8, 10, and 10, 8, 6, 4, 2. In *geometrical progression* terms increase or decrease in a certain constant ratio, as 2, 4, 8, 16, 32, 64, and 64, 32, 16, 8, 4, 2, or, generally, a, ar, ar^2, ar^3, ar^4, etc.

$$a, \frac{a}{r}, \frac{a}{r^2}, \frac{a}{r^3}, \frac{a}{r^4}, \text{ etc.,}$$

where a is the first term, and r the common ratio in the one case, and $1 \div r$ the common ratio in the other.

Progressive Party, a new political party organized in the United States in 1912. At meetings held in Chicago, June 22-23, 1912, part of the progressive forces at the Republican National Convention formed a new party and tendered its presidential nomination to Theodore Roosevelt. A more representative convention was assembled in August, in which Roosevelt was nominated for president and Governor Hiram W. Johnson of California for vice-president. Religious fervor marked the birth of the new party, and the object was declared to be the securing of a government that should be truly representative and that should right the social and industrial wrongs of the time.

Progressive Republican League, an organization of 'insurgent' Republicans formed in Washington in 1910, its purpose being the reform of party principles and methods. It advocated the election of United States senators by popular vote, direct primary nominations for all elections, direct election of delegates to Presidential conventions, and adoption of the initiative, referendum and recall.

Prohibition Party, an American political party organized at Chicago in 1869. Since 1884 it has forced action in nearly every State on the question of license as applied to the liquor traffic. Full prohibition now exists in Maine, Kansas, North Dakota, Georgia, Oklahoma, Alabama, Mississippi, North Carolina and Tennessee. In 1908 and 1912 the party candidates for president and vice-president were Eugene W. Chafin and Aaron S. Watkins.

Projec'tiles, Theory of, is that branch of mechanics which treats of the motion of bodies thrown or driven some distance by an impelling force, and whose progress is affected by gravity and the resistance of the air. The most common cases are the balls projected from cannon or other firearms. If thrown horizontally, the body will move in a curved path, because it retains unchanged (leaving out of account the resistance of the air) its horizontal velocity, while it falls faster and faster towards the ground. A body projected obliquely has initially a certain horizontal velocity and a certain vertical velocity. It retains its horizontal velocity unchanged, but its vertical velocity is altered by the force of gravity, and in both of these cases we find that the path of the projectile is a parabola. With a given velocity the greatest range of a projectile is obtained by projecting at an angle of 45° with the vertical. The actual path of a bullet is always within the parabola of the theoretical projectile, and hence the range of a gun is much less than what the parabola would give. The range depends also upon the shape and weight of the projectile and there is also its initial velocity to be taken into consideration. See *Gunnery.*

Projection (pro-jek'shun), the representation of something by means of lines, etc., drawn on a surface, especially the representation of any object on a perspective plane, or such a delineation as would result were the chief points of the object thrown forward upon the plane, each in the direction of a line drawn through it from a given point of sight or central point. This subject is of great importance in the making of maps, in which we have to consider the projection of the sphere or portions of it. Projections of the sphere are of several kinds, according to the situations in which the eye is supposed to be placed in respect of the sphere and the plane on which it is to be projected. See *Map.*

Prolapsus Ani (prō-lap'sus ā'ni), the protrusion of the lower part of the rectum through the anus, caused by straining in costiveness, piles, etc. Persons liable to this accident should be careful to regulate their bowels so as to prevent costiveness and consequent straining. Regular bathing of the parts with cold water may also be found useful.

Prolapsus Uteri (ū'tėr-i), 'falling down of the womb,' or 'bearing down,' a common affection among women who have borne large families, but sometimes occurring

in virgins, and in very rare cases in infants. What renders the falling down of the womb possible is a general laxity of the parts supporting it, and it may be of various degrees, from the slightest downward displacement to such a descent as causes external protrusion of the womb. When the falling down once begins it always tends to increase, unless means are taken to prevent it. In all cases of this affection the first requisite for cure is prolonged rest in the horizontal position, with the use, under surgical direction, of cold or astringent injections and the various forms of pessary.

Proletarii (prō-le-tā′ri-i), the name which was given to those Roman citizens who, in the classification of their means by Servius Tullius, stood in the sixth or lowest class. The term has been revived in modern times as a designation of the lowest class of the community; but more frequently the collective appellation *proletariat* is used. A *proletarian* is a member of the proletariat.

Prologue (prō′log), the preface or introduction to a dramatic play or performance. It may be either in prose or verse, and is usually pronounced by one person. Prologues sometimes relate to the drama itself, and serve to explain to the audience some circumstances of the action, sometimes to the situation in which the author or actor stands to the public, and sometimes have no immediate connection with either of these persons or subjects.

Prome (prōm), a town of Lower Burmah, capital of a district of same name, is situated on the Irrawaddy. It is a large town surrounded by a wall, with extensive suburbs, and, owing to the flat ground on which it is built, it is liable to be inundated by the river. It has a splendid pagoda which attracts many Buddhist pilgrims. There are manufactures and an active trade. Pop. 27,375.

Promerops (prom′e-rops), a genus of insessorial birds, many of which are remarkable for the beauty of their plumage. They have a longish bill, an extensible tongue, and feed upon insects, soft fruits, and the saccharine juices of plants. One species, *P. superba*, is a native of New Guinea; another, *P. erythrorhynchus*, is a native of Africa.

Prometheus (prō-mē′thūs), in Greek mythology, one of the Titans, brother of Atlas and of Epimetheus, and the father of Deucalion. His name means 'forethought,' as that of his brother Epimetheus signifies 'afterthought.' He gained the enmity of Zeus by bringing fire from heaven to men, and by conferring other benefits on them. To punish this offense Zeus sent down Pandora, who brought all kinds of diseases

Promerops superba.

into the world. He caused Prometheus himself to be chained by Hephæstus (Vulcan) on a rock of the Caucasus (the eastern extremity of the world, according to the notions of the earlier Greeks), where his liver, which was renewed every night, was torn by a vulture or an eagle. He was ultimately delivered by Heracles, who destroyed the vulture, unlocked the chains, and permitted Prometheus to return to Olympus. That is the tradition as shaped by Æschylus, who has a noble tragedy on the subject, the *Prometheus Vinctus* ('Prometheus Bound'), while Shelley has also a drama, the *Prometheus Unbound*. A different version is given by Hesiod.

Promise (prom′is), in law, an engagement entered into by one person to perform or not perform some particular thing. When there is a mutual promise between two parties it is termed a contract. A promise may either be verbal or written. A verbal promise is in the United States called a promise by parole, and a written promise is in technical language there called a covenant. By English law no promise is binding unless it was made for a consideration, but by Scotch law it is always binding, whether a consideration was given or not.

Promissory Note. See *Bill*.

Prompter (promp′tėr), one placed behind the scenes in a theater, whose business is to assist the actors when at a loss, by uttering the first words of a sentence or words forgotten.

Prong-buck, or PRONG-HORN ANTELOPE, a species of ante-

lope, the *Antilocapra Americana*, or *A. furcifer*, which inhabits the western parts of the United States. It frequents the plains in summer and the mountains in winter. It is one of the few hollow-horned antelopes, and the only living one in which the horny sheath is branched, branching being otherwise peculiar to deer which have bony antlers.

Pronoun (prō'noun), in grammar, a word used instead of a noun or name, or used to represent an object merely in relation to the act of speaking; thus it neither designates its object in virtue of the qualities possessed by it, nor always designates the same object, but designates different objects according to the circumstances in which it is used. The *personal pronouns* in English are *I*, *thou* or *you*, *he*, *she*, *it*, *we*, *ye*, and *they*. The last is used for the name of things, as well as for that of persons. *Relative pronouns* are such as relate to some noun going before, called the antecedent; as the man *who*, the thing *which*. *Interrogative pronouns* are those which serve to ask a question, as *who? which? what? Possessive pronouns* are such as denote possession, as *my*, *thy*, *his*, *her*, *our*, *your*, and *their*. *Demonstrative pronouns* are those which point out things precisely, as *this*, *that*. *Distributive pronouns* are *each*, *every*, *either*, *neither*. *Indefinite pronouns* are those that point out things indefinitely, as *some*, *other*, *any*, *one*, *all*, *such*. Possessive, demonstrative, distributive, and indefinite pronouns, having the properties both of pronouns and adjectives, are commonly called *adjective pronouns* or *pronominal adjectives*.

Pronunciamento (prō-nun-si-a-men'tō), in Spain and Spanish America, a proclamation against the existing government, intended to serve as a signal of revolt.

Proof (pröf). See *Evidence*.

Proof Impression, in printing, a rough impression from types, taken for correction. A first proof is the impression taken with all the errors of workmanship. After this is corrected another impression is printed with more care to send to the author: this is termed a *clean proof*. When this is corrected by the author, and the types altered accordingly, another proof is taken and carefully read over: this is called the *press proof*. In engraving, a proof impression is one taken from an engraving to show the state of it during the progress of the work; also, an early impression, or one of a limited number, taken before the letters to be inserted are engraved on the plate. Proof states of engravings are usually distinguished as (1) *Artists' Proofs*, with no engraved title, sometimes signed in pencil by the painter or engraver, or both. *Remarque* artists' proofs have some mark, frequently a minute part left white, or a design slightly engraved on the margin. (2) *Proofs before Letters*, still without title, but with artist's and engraver's names inserted close to the bottom of the work, and the publisher's name near the lower margin of the plate. (3) *Lettered Proofs*, with title engraved lightly in such a manner as to be easily erased, or in open letters ready for shading, when the title is finally put on the plate for the ordinary impressions.

Proofreading. The reading of printed matter for correction, the necessary corrections being made on the margin of the proof-sheet, an established set of signs being used. It is the purpose of the proofreader to make the printed matter conform to the author's MSS., but as this frequently needs correction, a good proofreader will endeavor to correct errors or inconsistencies due to the author. Several readings are necessary to yield a good result, one of these being usually made by the author. A final revision is made to see if all the corrections have been made by the compositor. See *Correction of the Press*.

Propaganda (prop-a-gan'da), an association, the congregation *de propaganda fide* (for propagating the faith), established at Rome by Gregory XV in 1622 for diffusing a knowledge of Roman Catholicism throughout the world, now charged with the management of the Roman Catholic missions. In close connection with it stand the seminaries or colleges of the Jesuits, and the great majority of the members of the propaganda are Jesuits and Franciscans.

Propagation (prop-a-gā'shun), the multiplication or continuation of the species of animals or plants. As a technical term it is used chiefly in regard to plants. The most common method of propagating plants is of course by their seed. There are other ways, however, by which plants are propagated naturally. Some, for example, throw off runners from their stems which creep along the ground, and these runners take root at the buds, and send up new plants. The commonest artificial methods of propagating plants are budding, layering, the various forms of grafting, including inarching or grafting by approach, propagation by offsets and by slips. Some plants (as the potato) are propagated by dividing the tubers or underground stems, each 'eye' or leaf-bud of which sends

up a new plant, while a few are propagated by cuttings of the leaves.

Propeller. See *Screw-Propeller.*

Propertius (prō-per'she-us), SEXTUS AURELIUS, a Latin elegiac poet, the date of whose birth is variously given as 57 and 46 B.C. After the end of the civil war he found a patron at Rome in Mæcenas; obtained the favor of the emperor; devoted himself to poetry; became the bosom friend of Ovid; lived mostly in Rome, and died there about 12 B.C. His elegies, of which we have four books, are not so highly esteemed as those of his friends Ovid and Tibullus.

Property Tax (prop'ėr-ti), a rate or duty levied by the State, county, or municipality on the property of individuals, the value of the property being fixed by assessment.

Prophets (prof'etz), among the Hebrews, inspired teachers sent by God to declare his purposes to his people. The ordinary Hebrew word for a prophet is *nâbhi*, generally interpreted as 'one who pours forth or announces.' There are two other words applied to the prophets, namely, *roëh* and *chozeh*, both of which literally signify seer, and are uniformly so translated in the Authorized Version of the Scriptures. In the Septuagint the word *nâbhi* is always rendered *prophētēs*, and in the Authorized Version *prophet.* The literal signification of the Greek word *prophētēs* is 'one who speaks for another'; but the word was generally used as meaning 'one who speaks for or interprets the will of a god.' In the common acceptation of the word its sense has become narrowed to that of a 'foreteller of future events,' but the wider acceptation still remains side by side with this narrower one. From the time of Samuel frequent mention is made of a body of men bearing the general name of prophets. They were members of a school in which young men of all the tribes were instructed in the law, and apparently also in sacred poetry and music. The first school of this nature appears to have been set up by Samuel at Ramah, and there is mention of others at Bethel, Jericho, Gilgal, and elsewhere. It is probable that these schools of the prophets were formed to strengthen the attachment of the Jews to their religion, and to maintain that religion pure. The prophetic order seems to have continued in existence down to the close of the Old Testament canon. Sixteen of them are the writers of books that are admitted into the Old Testament canon. These may be divided into four groups in such a manner as to give us a partial chronological arrangement. First, there are three prophets who belong to the Kingdom of Israel as distinct from that of Judah — Hosea, Amos, Jonah; secondly, there are eight prophets of the Kingdom of Judah — Joel, Isaiah, Jeremiah, Obadiah, Micah, Nahum, Habakkuk, Zephaniah; thirdly, two prophets of the captivity — Ezekiel and Daniel; and fourthly, three prophets of the return — Haggai, Zechariah, and Malachi. To the first group belong also Elijah and Elisha, the two great prophets, who are not the authors of any books in the canon. The chief function of the prophetic order was to maintain the Mosaic theocracy in its purity, and the patriotism which strongly characterizes all the Hebrew prophets was closely connected with their religious zeal. The Jewish people being the chosen of God and the immediate subjects of the divine ruler, it is the constant cry of the prophets that the people should turn to righteousness in order to be delivered from the hands of their enemies. The predictive powers of the prophets have been the occasion of much controversy. The ability of the prophets to foretell the future was generally believed in by the Jews, and in one passage of the Old Testament, Deut., xviii, 22, is made a negative test of the justness of a person's claim to be a prophet. The main controversies with regard to this predictive power turn upon two points — first, the reality of the power, which is by some altogether denied; and, secondly, the reference of the prophecies. With regard to the reference of the prophecies the chief controversy is connected with the prophetical writings of the Old Testament supposed to relate to the Messiah. Regarding these prophecies three different positions are taken up by different schools of Biblical critics. Those who deny to the prophets the power of foretelling future events altogether necessarily deny also the reference of the prophecies in question to Christ as the Messiah. Another school, while admitting the reference of at least some of the passages to historical events, contend that in their secondary meaning they have also a reference to the Messiah. The third school hold undeviatingly to the theory that none but the Messianic interpretation is permissible.

Propolis (prop'u-lis), a red, resinous, odorous substance having some resemblance to wax, collected from the viscid buds of various trees by bees, and used by them to stop the holes and crevices in their hives to prevent the entrance of cold air, to strengthen the cells, etc.

Propontis (prō-pon'tis), the ancient name of the Sea of Marmora, from being before or in advance of the Pontus Euxinus or Black Sea.

Proportion (pro-pōr'shun), in mathematics, the equality or similarity of ratios, ratio being the relation which one quantity bears to another of the same kind in respect to magnitude; or proportion is a relation among quantities such that the quotient of the first divided by the second is equal to the quotient of the third divided by the fourth. Thus 5 is to 10 as 8 is to 16; that is, 5 bears the same relation to 10 as 8 does to 16. Proportion is expressed by symbols, thus: — $a : b :: c : d$, or $a : b = c : d$, or $\frac{a}{b} = \frac{c}{d}$. The above is sometimes called *geometrical proportion* in contradistinction to *arithmetieal proportion*, or that in which the difference of the first and second is equal to the difference of the third and fourth. *Harmonical* or *musical proportion* is a relation of three or four quantities such that the first is to the last as the difference between the first two is to the difference between the last two; thus 2, 3, 6 are in harmonical proportion, for 2 is to 6 as 1 is to 3. *Reciproeal* or *invcrse proportion* is an equality between a direct and a reciprocal ratio, or a proportion in which the first term is to the second as the fourth is to the third, as $4 : 2 :: 3 : 6$ inversely, that is as $\frac{1}{3} : \frac{1}{6}$.

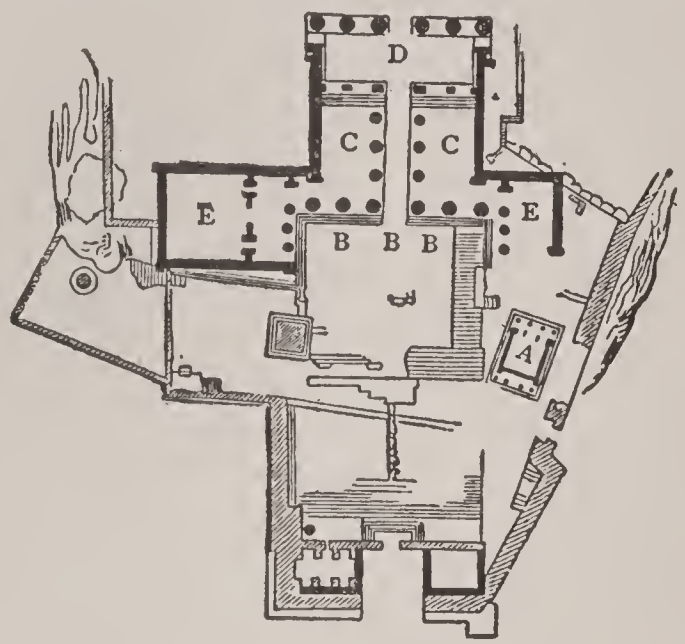
Proportional Compasses. See *Compasscs.*

Proportional Representation, in politics, a system of representation by which political parties are represented according to their numbers, and not in such a manner as that the majority elects all the representatives. Two plans for securing proportional representation have been tried, the one being by providing that voters shall only vote for a proportion of the representatives, say two out of three, or half when the number is even; the other being to give each elector a vote for every one of the representatives, those with the highest votes being elected according to the number each party is entitled to in proportion to the total vote cast.

Proposition, in grammar and logic, a sentence or part of a sentence consisting of a subject and a predicate, and in which something is affirmed or denied of a subject. Logical propositions are said to be divided, first, according to substance, into *catcgorical* and *hypothetical;* secondly, according to quality, into *affirmative* and *ncgative;* thirdly, according to quantity, into *univcrsal* and *particular.*

Proprætor. See *Prætor, Proconsul.*

Propylæa (prop-i-lē'a), in Greek architecture, the entrance to a temple. The term was employed particularly in speaking of the superb vestibules or porticoes conducting to the Acropolis of Athens. This magnificent



The Propylæa, Athens.

A, Temple of Nikè. B, Gateway. C, Court. D, Posticum. E, Wing buildings.

work, of the Doric order, was constructed under the direction of Pericles (B.C. 437-433) after the designs of Mnesicles, one of the most celebrated architects of his age.

Propylon. See *Pylon.*

Prorogation of Parliament, the continuance of parliament from one session to another. Parliament is prorogued by the sovereign's authority, either by the lord-chancellor in the royal presence, or by commission, or by proclamation.

Proscenium (prō-sē'ni-um), the part in a theater from the curtain or drop-scene to the orchestra; also applied to the curtain and the ornamental framework from which it hangs. In the ancient theater it comprised the whole of the stage.

Proscription (pro-skrip'shun), in Roman history, a mode of getting rid of enemies, first resorted to by Sulla in 82 B.C., and imitated more than once afterwards in the stormy years that closed the republic. Under Sulla,

lists of names were drawn out and posted up in public places, with the promise of a reward to any person who should kill any of those named in the lists, and the threat of death to those who should aid or shelter any of them. Their property also was confiscated, and their children were declared incapable of honors.

Prose (prōz), ordinary spoken or written language, untrammeled by poetic measure, and thus used in contradistinction to *verse* or *poetry*. The true character of prose can be clearly conceived only by considering it in relation to poetry. The two chief states of the inward man may be called the *thinking* and the *poetical* states, and depend upon the predominance of the understanding, or the imagination and feelings. If we think (in the narrower sense of the word) we combine ideas according to the laws of reason; and prose, which is the language of sober thought, is characterized by the abstractness and precision belonging to ideas that occupy the understanding. Artistic and finished prose is among the latest attainments both of nations and individuals, and it would appear that with most nations classical prose writers are fewer than classical poets.

Prosecution (pros-e-kū'shun), CRIMINAL. The law of America and of England differs from that of other countries in having no office analogous to what is termed in France *ministére public* for the prosecution of offenses. At common law, therefore, and in the great majority of cases, the so-called *prosecutor* is merely the person injured by an offense, who in the first instance obtains a summons or warrant against the accused. The result of this is that many criminals are allowed to go free merely because there is no prosecutor.

Proselyte (pros'e-līt; Greek, *prosēlytos*, a stranger or newcomer), a person who leaves one religion for the profession of another. The Jews, in New Testament times at least, had two classes of proselytes, namely, the 'proselytes of the gate,' as they were termed; and the 'proselytes of righteousness,' or of the covenant. According to the rabbis, the proselytes of the gate were those who renounced idolatry and worshiped the only true God according to the (so-called) seven laws of the children of Noah, without subjecting themselves to circumcision and the other commands of the Mosaic law. The proselytes of righteousness were persons who had been fully converted from paganism to Judaism, had been circumcised, and bound themselves to observe the Mosaic law.

Proserpine (pros'er-pīn). See *Persephonē*.

Prosimiæ (pro-sim'i-ē), a name applied to the lemurs and their allies.

Prosobranchiata (pros-u-brank'i-a-ta), an order of gasteropods comprising the whelks, periwinkles, etc., mostly marine, though some inhabit fresh water.

Prosody (pros'u-di), that part of grammar which treats of the quantity of syllables, of accent, and of the laws of versification. Though chiefly restricted to versification, it may also be extended to prose composition. In the Greek and Latin languages every syllable had its determinate length or quantity, and verses were constructed by systems of recurring feet, each foot containing a definite number of syllables, possessing a certain quantity and arrangement. The versification of modern European languages, in general, is regulated mainly by accent and number of syllables, though the weight or otherwise the quantity of syllables has also to be taken into account if harmonious verse is to be produced.

Prosopis (pro-sō'pis), a genus of tropical leguminous trees of the suborder Mimoseæ, having their pods filled between the seeds with a pulpy or mealy substance. Some of them yield useful products, as resin or tannin, food for cattle, etc. See *Mesquite*, *Algarobilla*.

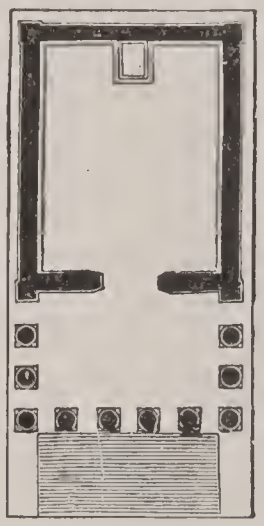
Prosopopœia (pros-o-po-pē'ya), a figure in rhetoric by which things are represented as persons, or by which things inanimate are spoken of as animated beings, or by which an absent person is introduced as speaking, or a deceased person is represented as alive or present. It includes *personification*, but is more extensive in its signification.

Prosper of Aquitaine, a Christian writer who lived during the early part of the fifth century, but of whom little is personally known. A large part of his life seems to have been spent at Marseilles, where he was connected with an ascetic order. It was here that he wrote his polemical poem *Adversus Ingratos*, and it is supposed that he finished his *Chronicon Consulare* (a continuation of Jerome's chronicle) at Rome about 455.

Prossnitz (prōs'nitz), a town of Austria, in Moravia, 11 miles S. S. W. of the town of Olmütz. It has manufactures of woolens and linen cloth and one of the largest corn-markets in Moravia. Pop. 24,054.

Prostate Gland (pros'tāt), a reddish glandular mass, situated in the pelvic cavity, and which surrounds the neck of the bladder and urethra in males. It is liable to enlargement, especially in old age, and is often the seat of various diseases.

Prostyle (prō'stīl), in architecture, applied to a portico in which the columns stand out quite free from the wall of the building to which it is attached; also applied to a temple or other structure having pillars in front only.



Plan of Prostyle Temple.

Protagoras (prō-tag'o-ras), a Grecian philosopher, born at Abdera, in Thrace, apparently about 480 B.C. He was the first to assume the title of Sophist, and as such he taught principally at Athens. In 411 B.C. he was accused of atheism, for beginning one of his works (*Peri Theōn* — Concerning the Gods) with the words, 'Respecting the gods, I am unable to know whether they exist or do not exist.' He seems to have died soon after, perhaps in the same year. He was the author of a large number of works, all of which are lost.

Proteaceæ (prot-e-ā'se-ē), a natural order of arborescent apetalous exogens, chiefly natives of Australia and the Cape Colony. They are shrubs or small trees, with hard, dry, opposite or alternate leaves, and often large heads of showy and richly-colored flowers, which render them favorite objects of cultivation. The typical genus *Protea* is African and contains numerous species. *Banksia* is a well-known Australian species bearing the popular name of honeysuckle.

Protection (pro-tek'shun), a term applied in economics to an artificial advantage conferred by a government or legislature on articles of home production, either by means of bounties or (more commonly) by duties imposed on the same or similar articles introduced from abroad. Such duties may be simply *protective*, that is, such as that the foreign and home articles can compete in the market on nearly equal terms: or *prohibitory*, that is, such as to exclude foreign competition altogether. The principle of protection has long been applied in the United States, as one of the main elements of Republican party politics, as opposed to the dogma of tariff for revenue only, maintained by the Democratic party. Of late years, however, the distinction in this respect between the policies of the two parties is much less pronounced than of old, and the tariff has become a less exclusive party issue than formerly. See *Free-trade*.

Protector (pro-tek'tur), a title conferred on several occasions by the English parliament upon those appointed to act as regents, generally during the minority of the king. Among those who have held this office are Richard, duke of York (1454); Richard, duke of Gloucester (1483); and the Duke of Somerset (1547). In 1653 the title of lord-protector was bestowed upon Cromwell, as head of the Commonwealth of England, and after his death (1658) his son Richard also held the title for a short period.

Protestant Episcopal Church.

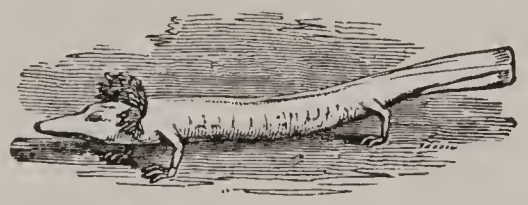
For the origin and early development of this church see *England, Ecclesiastical History*. Its origin in the United States reaches far back into the sixteenth century, when it was established in Virginia, and afterwards made its way into some of the other colonies, although it was not formally organized until 1785. Its doctrinal symbol in this country is the Thirty-nine Articles of the Church of England, slightly altered. The legislative authority is vested in a general convention, which meets triennially, consisting of a house of bishops and a house of clerical and lay deputies. Each diocese has a convention consisting of the clergy and lay representatives, having power to legislate in diocesan matters not regulated by the general canons of the church. This church has not made the progress in America of several of the other church organizations, but it has a membership of more than 900,000, and over 7500 churches, with about 105 bishops, regular and missionary.

Protestants (prot'es-tants), a name given to the party who adhered to Luther during the Reformation in 1529, and protested against, or made a solemn declaration of dissent from, a decree of the emperor Charles V and the diet of Spires, and appealed to a general council. The protesting members were the electors John of Saxony and George of Brandenburg, Princes Ernest and Francis of Brunswick-Lüneburg, Philip, landgrave of Hesse, and Wolfgang, prince of Anhalt, together with fourteen imperial cities, the chief of which were Strasburg, Nürnberg, Ulm, and Con-

stance. (See *Reformation.*) The name is now applied generally to those Christian denominations that differ from the Church of Rome and that sprang from the Reformation.

Proteus (prō′tē-us), in classical mythology, a marine deity who fed the flocks (seals) of Poseidōn (Neptune) in the Ægean Sea. He is represented as a soothsayer who prophesied only when compelled by force and art, and who tried every means to elude those who consulted him, and changed himself, after the manner of the sea gods, into beasts, trees, and even into fire and water.

Proteus, a genus of perennibranchiate batrachians. One species only has been hitherto discovered, namely, the *Proteus anguīnus*, which is found in subterranean lakes and caves in Illyria and Dalmatia. It attains a length of about 1 foot. The body is smooth, naked, and eel-like, the legs four in number,

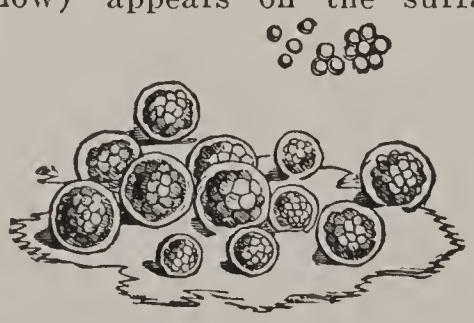


Proteus anguinus.

small and weak, the forefeet three-toed, the hinder four-toed, and, in addition to permanent external gills, it possesses lungs in the form of slender tubes. From its inhabiting places devoid of light the power of vision is unnecessary, and in point of fact its eyes are rudimentary and covered by the skin.

Prothonotary (pro-thon′a-tā-ri), a term for certain functionaries connected with the papal court who receive the last wills of cardinals, etc. In some of the United States the name of prothonotary is given to the principal clerk of some of the courts.

Protococcus (prō-to-kok′us), a genus of algæ. *P. nivālis* (red-snow) appears on the surface of



Protococcus nivālis (Red-snow), magnified and natural size.

snow, tingeing extensive tracts in the Arctic regions or among the Alps, in an incredibly short space of time, with a deep crimson. This plant, which may be regarded as one of the simplest forms of vegetation, consists of a little bag or membrane forming a cell. A large number of these are commonly found together, but each one is separate from the rest, and is to be regarded as a distinct individual.

Protocol (prō′tu-kul), in diplomacy, a document serving as a preliminary to, or for the opening of, any diplomatic transaction; also, a diplomatic document or minute of proceedings, signed by friendly powers in order to secure certain political ends peacefully. A notable instance was the protocol bringing an end to hostilities in the war between the United States and Spain, and preceding the regular treaty of peace.

Protogene (prō′tu-jēn), a species of granite composed of felspar, quartz, mica, and talc or chlorite; so-called because it was supposed to have been the first-formed granite. It occurs abundantly in the Alps of Savoy, and is found in Cornwall, where, on decomposition, it yields china-clay or porcelain-earth. It is also called *Talcose-granite.*

Protogenes (prō-toj′e-nēz), a Greek painter, contemporary with Apelles, born at Caunus in Caria, flourished between 332 and 300 B.C. Protogenes is said to have lived in comparative obscurity at Rhodes till the fiftieth year of his age, when his merits were made known to his fellow-citizens through a visit of Apelles.

Protophytes (prō′to-fītz), a name given to the lowest organisms in the vegetable kingdom, consisting either of a single cell or of several cells united by a gelatinous substance but without any essential mutual dependence, and corresponding to the Protozoa of the animal kingdom.

Protoplasm (prō′to-plazm), a substance consisting of carbon, oxygen, nitrogen, and hydrogen, nearly identical with the white of an egg, and constituting the most elementary living matter in animal and plant structures. It is colorless, transparent, and apparently destitute of structure, and is seen in its simplest form in some of the lowest types of animal life, as in the Protozoa. When unrestricted by an imprisoning envelope it is endued (as is seen in *Amœba diffluens*) with the power of extending itself in all directions in the form of mutable processes which can be withdrawn spontaneously, and it has also the power of passing or flowing in minute masses through closed membranes without these masses thereby losing their identity of form. In the form of cells, the skin

of which is merely dead and hardened protoplasm, and enclosing a nucleus, or with a nucleus embedded in its substance, it is the structural unit of all organized bodies, constituting not only the basis of the ovum of both plants and animals, but of the tissues themselves in their perfect state, which are mere multiples of such cell-units variously modified. As the protoplasm in our bodies is continually undergoing waste, a continuous renewal of the material is essential to the continuance of life. Animals, however, cannot elaborate protoplasm from mineral substances for themselves, they being able only to convert by the process of digestion dead protoplasm into living. Plants can, on the other hand, manufacture protoplasm from mineral compounds and the atmosphere, and so they are the storehouse of protoplasmic matter for the animal kingdom. Some biologists prefer the term *Bioplasm* to that of *Protoplasm*, as being more expressive of its function. *Sarcode* is also used similarly.

Protornis (prō-tor'nis), the name given to the earliest fossil passerine bird yet known. In size and structure it approaches the lark, and it occurs in the Eocene strata of Glarus.

Protosaurus (prō-tu-sạ'rus), the name given to a fossil monitor lizard, which occurs in the Durham Permian rocks. It was long the earliest known fossil reptile.

Protozoa (prō-tu-zō'a), a subkingdom including the most lowly organized members of the animal kingdom. The Protozoa may be defined to be animals composed of a nearly structureless jelly-like substance termed *sarcode* or *protoplasm*, not possessing permanent distinction or separation of parts, and without a definite body cavity or trace of a nervous system. The animals present the appearance of a transparent, gelatinous cell containing a nucleus. In many, contractile vesicles have been observed which perform the office of a heart. The organs of locomotion are varied. In some of the higher forms movements are effected by means of cilia, in others by long, whip-like bristles termed *flagella*. but the most characteristic organs of locomotion are processes named *pseudopodia*, consisting simply of prolongations of the sarcodic substance of the body, which can be emitted and retracted at pleasure. The Protozoa, with the exception of a few inhabiting the bodies of animals, are aquatic in their habits, and, save the sponges, generally of microscopical size. They have not the usual reproductive organs, this function being fulfilled by means of simple cleavage or 'fission,' and, except in the higher forms, they have no differentiated mouth, the food being simply absorbed. From this fact the Protozoa have been divided into those that have a distinct external mouth and those that have no distinct mouth; but this classification has no great value. A better mode of division is into the three classes of *Gregarinidæ*, *Rhizopoda* and *Infusoria*. See these terms.

Proudhon (prö-dōṇ), Pierre Joseph, a French publicist, born at Besançon, in 1809; died there in 1865. He was the son of poor parents, who were unable to pay for his education, but he was enabled to attend gratuitously the college of his native town. At the age of nineteen he entered a printer's office, afterwards became a press reader, and in this way acquired considerable linguistic knowledge, with the result that he wrote an *Essai de Grammaire Générale*. As a reward for his studious labors he had conferred on him by the Academy of Besançon the *pension Suard*, which yielded him an income of 1500 francs for three years. Political economy now became his chief study, and in 1840 appeared his famous work, bearing on the title-page the question: *Qu'est-ce que la Propriété?* ('What is property?'), to which the first page of the treatise contains the answer, *C'est le Vol* ('it is theft'). For this treatise, and two others which followed, he was prosecuted at Besançon, but was ultimately acquitted. In 1843 he managed a system of water transport on the Rhône and Saône; settled in Paris in 1847; started various newspapers, and became a leader in the revolution of 1848; was elected a representative for the Seine in the Constituent Assembly; attempted with no success to found a Banque du Peuple; and for his outspokenness in the press he was imprisoned for three years. Besides those already noticed his more important treatises are: *Discours sur la Célébration du Dimanche*, *De la Création de l'Ordre dans l'Humanité*, and *Système des Contradictions Economiques*.

Prout, Father. See *Mahony, Francis*.

Prout, Samuel, painter in water-colors, born in Plymouth in 1783; died in 1852. He received a few lessons in drawing in his native town, and prosecuted his work by industriously sketching from nature. In 1803 he visited, and in 1812 finally removed to London, where he maintained himself by receiving pupils and furnishing drawings for Britton's topographic and architectural publications. He was an occasional exhibitor at the Academy and British Institution

from 1803 to 1827, and was one of the earliest members of the Society of Painters in Water-colors. In 1818 he visited the continent, after which he made repeated artistic tours; he became famous for his drawings of street scenes and the quaint mediæval architecture of Europe. Some of his sea-coast scenes exhibit great power. His drawings are held in much repute.

Provençal (prō-vaṇ-sal′) LANGUAGE AND LITERATURE, strictly the language and literature of that portion of Southern France known as Provence, but in its widest application the Provençal language includes the Romance form of speech belonging to the inhabitants of a geographical area which comprises the whole south of France (especially Provence, Limousin, Auvergne), with Catalonia and Valencia in Spain. This language was the earliest cultivated of the Romance languages (or those based on the Latin), and at one time was extensively used in literature. It was also called *langue d'oc* in contradistinction to the kindred speech of Northern France, the *langue d'oui;* and yet again it received the name of *lengua lemosina* probably from the wide fame of a few Limousin troubadours. Provençal, as a new and distinct language, appears in historical records about the tenth century, and continued as a medium of living literary expression until about the end of the thirteenth century. In 1350 a few scholars of Toulouse attempted to revive its decaying glory, and for this purpose composed a treatise on grammar and poetry called the *Leys d'Amors.* About the middle of the fifteenth century the language ceased to be used both for administrative and literary purposes, and it has long been reduced almost to the condition of a *patois.* In the last century such poets as Jasmin and Mistral have endeavored to resuscitate Provençal as a literary language, and have produced poems of no small value written in the modern form of it; while a society of literary men and scholars (*lou Felibrige*) exists for the purpose of furthering this object. Still Provençal is a language whose interest as a vehicle of literature is mainly in the past. This interest begins in the early part of the eleventh century with a didactic poem, based by its unknown author on the *De Consolatione Philosophiæ* of Bœtius; but Provençal literature in its development found most characteristic expression in the amorous lyrics of the troubadours. The earliest of these lyric poets was William IX, count of Poitiers, about the close of the eleventh century, who was followed in France, Italy, and Spain by an innumerable band of poets in the Provençal tongue. Most of this poetry was intended to be sung, and not infrequently the poet also composed his own music. Besides the lyric poetry, of which there were various classes, Provençal poetry also existed of a narrative character, in which legendary and historical themes were treated in epical detail. The rapid decay of this Provençal literature, which was almost exclusively the possession of the upper classes, was largely due to political causes. During the war with the Albigenses the social condition of the feudal nobility in the south of France suffered such downfall that thenceforth the art of the troubadour and the minstrel ceased to be lucratively attractive. See *Troubadour.*

Provence (pro-vâṇs), one of the old provinces of France, lying in the southeastern part of the country, on the Mediterranean, bounded on the north by Dauphiné and Venaissin, on the east by Piedmont, and on the west by Languedoc. It now forms the departments of Bouches-du-Rhône, Var, and Basses-Alpes, with parts of Vaucluse and Alpes Maritimes. The capital was Aix, and the province was divided into Upper and Lower Provence. Greek colonies were founded here at an early period; and the Romans having conquered all the southeast of Gaul (B.C. 124-123) gave it the name of *Provincia Gallia,* or simply *Provincia* (the province), whence its later name was derived. It passed successively into the hands of the Visigoths, Ostrogoths, Franks, and in 879 became part of the kingdom of Burgundy. It subsequently was ruled by the counts of Arles, and the counts of Barcelona, then by Charles of Anjou (brother of Louis IX of France) and his descendants, and passed to Louis XI of France in 1481.

Proverb (prov′erb), a short, pithy sentence forming a popular saying and expressing some result of the experience of life in a keen, quaint, or lively fashion. Proverbs have been defined by Cervantes as 'short sentences drawn from long experiences'; by Howell as sayings which combine 'sense, shortness, and salt'; by Bacon as 'the genius, wit, and spirit of a nation'; and by Earl Russell as 'the wisdom of many, and the wit of one.' They have formed an important part of the common wisdom of both eastern and western civilizations, and in this way they are interesting in a study of the spread and structure of language, as it has been pointedly applied to changing manners and customs. Greek and Latin proverbs

were collected by Erasmus in his *Adagia;* English proverbs have been collected by Camden, Howell, Ray, Kelly, Bohn (an enlarged and improved edition of Ray), and Hazlitt; Scotch by Allan Ramsay and by A. Hislop; French by De Lincy; German by various collectors, more especially Wander; Arabic by Burckhardt and by Freytag; Bengali by Long.

Proverbs, one of the canonical books of the Old Testament, usually in the main ascribed to Solomon, in accordance with the superscriptions in chap. i, 1; x, 1; xxv, 1, which, if not written by Solomon himself (as the first two of them may have been), at least represent the traditional views of the ancient Jewish Church. According to modern Biblical critics, the book of *Proverbs* is composed of several sections written by different authors and at different times, and finally collected into a single book at some period subsequent to the return from the captivity. All seem to be agreed that some part of the book is to be ascribed to Solomon, but there is great diversity of opinion as to how large his share is. With regard to the other two contributors to *Proverbs* named in the book itself, Agur and Lemuel, nothing whatever is known; and in the case of Lemuel it is even suspected that the name is not that of a real personage. The canonicity of the book of *Proverbs* is represented as a subject of dispute in the *Talmud*, some having objected to receive the book as canonical on account of the contradictions it contains. It ultimately found its place, however, in all the Jewish lists of the sacred writings.

Providence (prov'i-dens), a city and capital of the state of Rhode Island (Newport formerly being also a capital), situated on both sides of the Providence or Seekonk River, at the head of Narragansett Bay, 40 miles S. S. W. of Boston. In the center of the city the river expands into a circular sheet of water called the Cove, nearly a mile in circumference, surrounded by an attractive elm-shaded park. The land on the eastern side of the river is hilly, on the western it is more level. There are many fine public and private buildings. Of the former the most important are the city hall, library building, court house, Atheneum, Rhode Island and Rutter Hospitals, the buildings of Brown University, etc. With Brown University (founded in 1764), there is a library of about 200,000 volumes. At the south end of the city is Roger Williams Park, containing a statue of Roger Williams, the founder of the city. Providence is notable for its manufacturing industries, it being one of the great centers of manufacture of the country. Prominent among its productions are silverware, screws, tools, locomotives, etc., with many others, including flour and saw mills, cotton and woolen factories, foundries, steam-engine and boiler factories, machine-shops, printing, bleaching, calendering, and dye works, etc. Providence has a safe and commodious harbor, though somewhat difficult of access, and the coasting trade is important. It was at one time an important seat of foreign commerce, but this has declined. Providence was first settled in the year 1636, incorporated in 1649, and has rapidly increased in size since 1820. Pop. 224,326.

Province (prov'ins), originally a country of considerable extent, which being reduced under Roman dominion was new modeled, subjected to the command of a governor sent from Rome, and to such taxes and contributions as the Romans saw fit to impose. In modern times the term has been applied to colonies or to independent countries at a distance from the metropolis, or to the different divisions of the kingdom itself. Thus the Low Countries belonging to Austria and Spain were styled *provinces.* The different governments into which France was divided previous to the revolution were also called provinces. The name has sometimes been retained by independent states. Thus the Republic of Holland, after it had thrown off the Spanish yoke, was called the United Provinces; and the Argentine Republic used to be called the United Provinces of the Plata. In the canon law the term is applied to the jurisdiction of an archbishop. In the Roman Catholic Church it is also given to the territorial divisions of an ecclesiastical order such as the Franciscans.

Provins (pro-vaṇ), a town in France, department of Seine-et-Marne, 30 miles east of Melun, and 60 miles S. E. of Paris. It has remains of old walls, a tower called Cæsar's Tower, a church of the twelfth century, etc. Provins is mentioned in a capitulary of Charlemagne in 802, and in the thirteenth century it was a large and important city. It derives its modern reputation from its mineral waters. Pop. (1906) 7546.

Provo (prō'vō), a city of Utah, the seat of Utah Co., on Provo River, 3 miles E. of Utah Lake, and 48 miles S. S. E. of Salt Lake City. It contains a state insane asylum, has flour, woolen, and knitting mills, and is sur-

rounded by a fertile farming country. Pop. 8925.

Provost (prov'ust, prō'vō), a title given to the president of certain bodies, as the heads of several of the colleges in the Universities of Oxford and Cambridge, equivalent to *principal* in other colleges. In the Scotch burghs the provost is the chief magistrate, corresponding to the English mayor. The chief magistrates of Edinburgh and Glasgow are styled *lord provost*. In the United States there is a limited use of the term *provost*, applied to the chief officer of an educational institution.

Provost-marshal, in the army, is an officer of the rank of a captain, who deals with offenses against discipline, brings the offenders to punishment, and sees the sentence executed. In the navy there is a similar office.

Prudentius (pru-den'she-us), AURELIUS CLEMENS, one of the early Christian poets, born at Calagurris in Spain in 348 A.D.; died after the beginning of the fifth century. In his latter years he composed a great number of hymns and other poems of a religious nature in which he successfully imitated classical models.

Prudhon (prü-dōn), PIERRE, a French painter, born in 1758; died in 1823. He studied his art at Dijon and in Rome, where he came under the influence of Correggio and of Leonardo. He afterwards settled in Paris, where he gradually made his way, and at length became famous by his *Truth Descending from Heaven, Psyche Carried off by Zephyr, Crime Pursued by Justice and Divine Vengeance*, etc. His importance consists in the fact that, in opposition to David, he accentuated the purely pictorial element and the effect of light in his works.

Prunella, Prunello (prö-nel'a, o), a kind of woolen stuff of which clergymen's gowns were once made, and which is still used for the uppers of ladies' boots and shoes. Prunella is also the name of a genus of plants, order *Labiaceæ*, with one American species, known as Blue-curl or Self-heal, at one time in repute as a febrifuge. It is mildly aromatic and slightly astringent. Prunello (diminutive of prune) is the name given a kind of plum.

Prunes. See *Plum*.

Pruning (prön'ing), is the severing of portions of the stem, branches, shoots, leaves, or roots of a plant for the purpose of removing excrescent or unprofitable growths, and rendering the sap more conducive to the nutrition of the valuable parts of the plant. The immediate effect of pruning is to reduce the growth of a plant in as far as it depends on the amount of foliage duly exposed to the light; but as by judicious pruning the parts left have not only a greater share of sap, but are better exposed to the light, its ultimate effect is to produce a larger and stronger plant. From the tendency of sap to flow in increased quantity into the parts immediately adjoining those where its flow has been interrupted, an almost unlimited power is given to the gardener of controlling the direction of the growth of a plant. The season for pruning varies with the nature of the tree and the purpose for which it is pruned. In general it may be said that autumn and winter are the best seasons for extensive pruning; in summer an excess of vigor in the plant may require a little pruning, but in spring it not only weakens the plant, but is liable to induce disease. *Root-pruning* is employed to check rapidity of growth and to induce development of flower-buds. The best season for this operation is after the leaves have fallen in autumn or before the sap begins to flow in spring.

Prunus (prö'nus), a genus of arborescent plants belonging to the nat. order Rosaceæ, and comprehending the cherry, bird-cherry, plum, damson, sloe, bullace, apricot, etc.

Prurigo (prö-rī'gō), a papular eruption of the skin in which the papules are diffuse, nearly of the color of the cuticle, intolerably itchy, the itching being increased by sudden exposure to heat, and when abraded oozing out a fluid that concretes into minute black scabs.

Prussia (prush'a; German, PREUSSEN), KINGDOM OF, the leading state of the German Empire, comprising the greater part of Northern and Eastern Germany, and part of Western Germany, divided as in the following table: —

Provinces.	Area — sq. miles.	Population.
East Prussia	14,275	1,996,626
West Prussia	9,846	1,563,658
Brandenburg	15,400	3,108,554
Pomerania	11,623	1,634,832
Posen	11,178	1,887,275
Silesia	15,557	4,668,857
Saxony	9,746	2,832,616
Schleswig-Holstein	9,273	1,387,968
Hanover	14,853	2,590,939
Westphalia	7,798	3,187,777
Hesse-Nassau	6,055	1,897,981

Rhineland	10,418	5,759,798
Hohenzollern	441	66,780
Berlin (city)	25	1,888,848
	136,488	34,472,509

This table is from the census of 1901, and the population has since increased to 40,157,573 (1911). The great bulk of the people are of the German race, with about 3,300,000 non-Germans, chiefly Poles and Jews. The capital and largest city is Berlin, other important cities being Breslau, Cologne, Danzig, Düsseldorf, Frankfort, Hanover, Königsberg, and Magdeburg.

Physical Features.— The whole of northern and eastern Prussia, from Holland on the west to Russia on the east, belongs to the great plain of Northern Europe, and may be described generally as a vast plain, elevated in the south and southwest, and thence descending towards the Baltic and the German Ocean. The loftiest summits are on the southern frontiers, where the Riesengebirge and the Sudetic Mountains form the boundary between Prussia and the Austrian dominions. The highest Prussian mountain is the Schneekoppe in the Riesengebirge (5257 feet). Further to the west the Thuringian forest and the Harz Mountains cover a considerable area, the latter rising in the Brocken to the height of 3742 feet. On the shores of the Baltic and North Sea, large tracts are only saved from inundation by low sand hills. Behind these hills extensive lagoons, on the Baltic coast called Haffs, have been formed, communicating with the sea by narrow outlets. The chief bays or gulfs are Danzig Bay, Pomeranian Bay, and Kiel Bay, all on the Baltic coast; and on the Baltic coast are the islands of Rügen, Usedom, Wollin, etc.; in the North Sea the North Frisian Islands and East Frisian Islands. The principal river which drains this portion of Prussia is the Elbe, which enters it from the Kingdom of Saxony, flows northwestward, and enters the North Sea between Hanover and Holstein. The Weser, with its tributary the Aller, and the Ems, are the principal rivers west of the Elbe. The Oder lies almost wholly within Prussian territory, and enters the Baltic by the Pommerische Haff. The Vistula or Weichsel flows in a northern direction through Eastern Prussia, and throws off two large branches which enter the Frische Haff, while the main stream passes into the Gulf of Danzig. The other more important rivers are the Passarge, the Pregel, and the Niemen or Memel. Lakes abound in almost every province, but more especially in those of East and West Prussia, Pomerania, and Brandenburg. The chief coast lagoons are the Pommerische Haff, Frische Haff, and Kurische Haff. The climatic conditions of this extensive territory must necessarily be diversified. The average of a number of places situated between the highest and lowest latitudes gives a mean annual temperature of 52° Fahr.

The southwestern division of Prussia, consisting of the greater part of Westphalia, the Rhenish province, and Hesse-Nassau, differs so much from the eastern division as, in many respects, to present a striking contrast to it. In particular, its surface as a whole is much more finely diversified. Its mountains stretch across the country in all directions, and from numerous valleys, one of which, that of the Rhine, in point of fertility and beauty is not surpassed by any other valley in Europe. Though the surface is thus diversified, the mountains nowhere reach any great elevation, the highest summit being the Wasserkuppe, on the borders of Bavaria, 3316 feet. By far the greater part of this portion of the Prussian monarchy belongs to the basin of the Rhine, which, entering it on the southeast, traverses it in a N. N. W. direction till it enters Holland. There are numerous streams tributary to the Rhine, the largest being the Moselle, with its tributary the Saar. There are no lakes worth mention in this portion of Prussia. As compared with the division already described, the climate of this part of Prussia is milder in winter and cooler in summer, the mean annual temperature being about 1° higher.

Agriculture, etc.— The land in Prussia is much subdivided, especially in the more populous districts, small farms of 3 or 4 acres being the most common holding. In East and West Prussia the soil is for the most part poor; the Rhine valley and the province of Saxony may be considered the most productive portions of the kingdom. Rye is the chief agricultural product, oats are largely grown in the northeast, wheat chiefly in the south and west, while the other grain crops are spelt (an inferior sort of wheat), maize, millet, and barley. Potatoes are extensively cultivated; beet-root for the production of sugar is a very important crop; flax, hemp, and rape-seed cover large areas; tobacco is raised in several provinces; and in the Rhine and Moselle districts the vine is freely cultivated and some of the finest wines produced. In East Prussia horses are reared chiefly for military purposes; cattle are largely

exported from the maritime provinces, and in West Prussia and Pomerania sheep are raised in large numbers. Along the Baltic and the North Sea a considerable number of the inhabitants are employed in the fishing industry. The forests cover about 20,000,000 acres, nearly one-fourth of the total area, and are a great source of wealth, forestry being nowhere better understood than in Prussia. The best wooded provinces are Brandenburg, Silesia, and Rhenish Prussia. In some of the forests the wild boar is common, other wild animals being the wolf, lynx, wild-cat, etc.

Mining and Manufactures.— Mining is one of the chief branches of Prussian industry; the most important mineral products being coal and lignite, iron, copper, lead, silver, and zinc, while other minerals produced to a greater or less extent are cobalt, nickel, arsenic, antimony, manganese, rocksalt, kainit and other potash salts, alum, and copperas. About a third as much coal is raised in Prussia as in Britain, the chief coal-fields being in the Rhine province, Westphalia, and Silesia. Iron is found in all parts, the principal areas being Westphalia, Silesia, the Rhine province, and the Harz; copper is found chiefly in the Harz and Westphalia; silver chiefly in Hanover; lead is found in Silesia, the Rhenish province, Westphalia, and Saxony; zinc in the same localities, except Saxony; cobalt in Westphalia and Saxony; arsenic in Silesia. Amber is found along the shores of the Baltic. The chief textile manufactures are those of linens, cottons, and woolens. Silesia, Brandenburg, and Westphalia are the provinces in which the linen industry is chiefly developed; the cotton manufacture is most extensive on the Rhine; the woolen manufacture has its chief seats in Brandenburg and the Rhenish province; while silk and velvet are made in the Rhine valley, as also at Berlin. In iron and steel ware the chief manufacturing centers are Essen, Solingen, Aix-la-Chapelle, and Burtscheid. At Essen are located the great Krupp ordnance and armor-plate works, nowhere surpassed in output. The manufacture of porcelain and the finer kinds of ware is extensive, and leather and paper making are large industries. Other manufactures of national importance are beet-root sugar, chocolate, chicory, chemical products, and tobacco.

Trade and Commerce.— Prussia carries on a large trade both by sea and with its inland neighbors. The principal exports are textile fabrics, yarn, metals and metal wares, agricultural produce and live stock, wool, chemicals, spirits, coal, timber, leather, stoneware and glass, etc.; and the imports are chiefly in the raw materials connected with the textile and other manufactures, and tea, coffee, sugar, and other colonial products. Besides the ordinary road and canal communication, Prussia has an extensive system of railways, nearly all national property. The principal ports are Memel, Pillau, Königsberg, Danzig, Stettin, Stralsund, Kiel and Flensburg on the Baltic; and Altona on the North Sea. In some of these ports, and particularly Stettin, shipbuilding is carried on with considerable activity. The system of money, weights, and measures is the same as that of the rest of Germany. See *Germany*.

Government, Administration, etc.— Prussia is a monarchy hereditary in the male line, the present constitution of which was framed by the government, with the aid of the constituent assembly, in 1850, and subsequently modified by royal decrees. The king is assisted in the executive by an irresponsible privy-council and by a cabinet which is nominally responsible to a legislative assembly composed of two chambers. The upper chamber (Herrenhaus) is composed of princes of the blood of the reigning and former sovereign families of full age, the heads of the mediatized principalities, the territorial nobility created by the king, life peers chosen by the king, and a few titled nobility elected by resident land-owners, etc. The second chamber or House of Deputies (Haus der Abgeordneten), since the enlargement of the kingdom, consists of 433 members. The primary qualification of electors is based on taxation, and the primary electors are divided into three classes. The first division consists of those who pay the highest taxation, the second of those who pay the medium, and the third of those who pay the lowest amounts. The indirect electors (Urwähler) elect the direct electors (Wahlmänner), who choose the representatives. The deputies are chosen for three years. The principal items of revenue are direct taxes, state railways, domains and forests. For local administrative purposes the kingdom is divided into provinces, governmental departments, circles, and communes, and all recent legislation has tended to reinforce local authority and discourage centralization. At the head of each province is a president or governor and also a military commandant. Prussia is by far the most important state in the German Empire, to the Bundesrath or Federal Council of which

it sends 17 members, while to the Reichstag or Diet it sends 236 deputies (more than half the total number). Although the reigning family and nearly two-thirds of the total population are Protestants, absolute religious liberty is guaranteed by the constitution. The clergy, both Protestant and Roman Catholic, are paid by the state. A complete system of primary, secondary, and university education exists, all grades of schools being linked together according to a definite scheme or schemes of study. Elementary education is enforced by law, maintained by local taxes, and administered by local authority. Prussia has ten universities — Berlin, Bonn, Breslau, Göttingen, Greifswald, Halle, Kiel, Königsberg, Marburg and Münster, attended by some 15,000 students in all. All private as well as public educational establishments are placed under the superintendence of the minister of public instruction, and all public teachers are regarded as servants of the state. The Prussian army and navy form an integral part of those of Germany in general. See *Germany*.

History.— The historical development of the Prussian Kingdom is closely associated with three important elements. The first of these is found in the growing power of the Electorate of Brandenburg, which formed the nucleus of the future kingdom; the second relates to the acquirement of the province of Prussia, which gave its name to the new heterogeneous territory; and the third is associated with the rule of the Hohenzollern family, under whose skilful diplomatic and military guidance the small Brandenburg electorate has grown into what is now considerably the larger portion of the German Empire. Brandenburg, which had been conquered by Charlemagne in 789, was erected into a margraviate by Henry I (the Fowler), emperor of Germany in 926. Albert the Bear, who received Brandenburg as a fief from the Emperor Lothaire (1134), conquered the Slavonian Wends, and took in 1157 the title of Margrave of Brandenburg. His dynasty continued to bear rule till 1320, and during this period German civilization was gradually extended in Pomerania, Saxony, Brandenburg, and Silesia. After its extinction there followed a period of anarchy, during which Brandenburg fell as a lapsed fief to the empire, and Louis of Bavaria gave it to his son. Remaining under Bavarian rule for three electorates it was subsequently ceded to the house of Luxemburg, and Charles IV, the first imperial representative of this house, gave it successively to his sons Wenceslaus (1373) and Sigismund (1378). The latter being in debt received from Frederick, the burgrave of Nürnberg, a loan of 400,000 gold florins, for which Frederick held Brandenburg in pawn, and subsequently acquired it in full. This burgrave was the descendant of Conrad of Hohenzollern, a cadet of a Suabian family to whom belonged a small territory surrounding the ancestral castle of Hohenzollern, of which they traced their lordship back to the time of Charlemagne. Brandenburg, which Frederick had thus acquired, was covered with feudal strongholds, which he gradually reduced, and he also added the two small territories of Ansbach and Baireuth. Frederick II, who succeeded his father in 1440, extended the possessions of his family by policy as well as by valor. In 1470 he abdicated in favor of his brother Albert III, surnamed Achilles, who, by a family ordinance, prepared the way in an important respect for the future greatness of his house by providing for the undivided descent of the dominions in connection with the electorate. His grandson, Joachim II, who succeeded in 1535, embraced the Reformation, and established Lutheranism in 1539. In 1537 he acquired the reversion of the principalities of Liegnitz, Brieg, and Wohlau. John George succeeded in 1571. Joachim Frederick, who succeeded in 1598, married his son John Sigismund to the daughter of Frederick Albert, duke of Prussia; and in 1618 John Sigismund united the duchy of Prussia to the electorate, thus bringing it about that the whole country became known as Prussia.

The Prussians were a Slavonic people inhabiting the coast territory situated between the Vistula and the Niemen. Their neighbors, the Poles, endeavored to convert them to Christianity, and to this end they (1283) conquered the whole country with the aid of the Teutonic Knights of St. George. As the price of this assistance the knights claimed the conquered territory, and established themselves in castles and walled cities. Their rule, which was a despotic oligarchy, was finally overturned by the combined forces of the Prussians and the Poles, and in 1466 West Prussia was ceded to Poland and East Prussia made a fief of the Polish crown under a grandmaster, and later under a duke. It was as successor to Duke Frederick Albert, his father-in-law, that John Sigismund obtained the duchy of Prussia. By the treaty of Xanten (1614) Clèves, La Marck, etc., were assigned to Brandenburg, and in this manner was laid the

foundation of the Prussian Rhine province.

John Sigismund was succeeded in 1619 by his son George William, who was a weak and vacillating ruler, unequal to encounter the terrible crisis that now occurred in the affairs of Germany, the Thirty Years' war. During this war the electorate became the battleground of the contending forces, and suffered severely, being at the death of the elector in 1640 occupied by Swedish troops. A very different man was his son Frederick William (which see), called the Great Elector, who may be regarded as the virtual founder of the Prussian monarchy. He found his country weak, and left it strong and with its boundaries extended, and provided with a well-equipped army and a well-filled treasury. Dying in 1688, he was succeeded by his son Frederick, who in 1701 had himself crowned as king, being the first King of Prussia. Under his rule the Prussian troops fought side by side with the English at Blenheim, Ramillies, Oudenarde, and Malplaquet. Frederick I was succeeded by his son (1713) Frederick William I, who governed Prussia till 1740. His reign was on the whole peaceful, and the country grew greatly in population, industry, and wealth. He went to war with Charles XII, and acquired part of Pomerania, with Stettin, from Sweden. At his death he left a prosperous country, a well-supplied treasury, and an army of 80,000 men to his successor.

Frederick II, surnamed the Great (which see), succeeded to the crown on the death of his father in 1740. In less than a year after his accession he proclaimed war against Maria Theresa in order to enforce his claim to the Silesian principalities, and invaded Silesia. At the persuasion of England Maria Theresa entered into negotiations with him, but failed at first to come to an understanding. Ultimately, however, by a treaty concluded at Berlin (1742) Frederick obtained the cession, with the exception of some specified districts, of both Upper and Lower Silesia, and of Glatz. Conceiving that the Austrians might seek to regain this territory, Frederick in 1744 invaded Bohemia, and commenced what is called the Second Silesian war. He was at first compelled to retreat, but subsequently gained such successes that, when peace was concluded in 1745, Austria confirmed the cession of Silesia, which was guaranteed by Great Britain. Prussia now enjoyed an interval of prosperous peace, which the king was desirous to maintain. But his continued success had aroused the fear of Austria and the enmity of France and Russia, so that these powers projected a scheme of conquest which embraced the partition of Prussia. Before their plans could be matured Frederick invaded Saxony, entered Dresden, and published the despatches which proved the existence of the scheme. England now openly entered into a defensive alliance with Frederick, and subsidized him. The allies, whose plans had been discovered (Austria, France, Russia, and Sweden), prepared for immediate hostilities. In the Seven Years' war (which see) following upon this movement, the immense forces which his enemies were able to bring into the field reduced Frederick to the greatest straits, and gave opportunity for the development of his strategic genius. Towards the close of the war the English cabinet began to draw off from the Prussian alliance, but the death of the Empress Elizabeth (1762) broke up the alliance against Prussia, and the Peace of Hubertsburg (1763) put an end to the war. According to Frederick's calculation, 886,000 men had perished in a war which failed in effecting any territorial change; but it transformed Prussia into one of the chief European powers. Frederick determining again to extend his boundaries, entered into an alliance with Austria, and invaded the territories of Poland. Negotiations followed with Russia, and in 1772 the partition of the weak kingdom of Poland was arranged in a treaty between the three powers. In this way Prussia obtained most of Pomerania and a large portion of Poland. (See *Poland.*) Frederick died in 1786, and was succeeded by his nephew Frederick William II.

The new king had neither the military skill nor the strength of character possessed by his predecessor. He continued the absolutism, but curtailed some of the freedom of the former reign. In 1788 he made a useless armed intervention in the affairs of Holland, and in 1791 interfered in the affairs of France on behalf of Louis XVI. In 1792, war having already been declared by the French authorities against the empire, the Prussians, under the Duke of Brunswick, invaded France. They were defeated by Kellerman at Valmy, and soon afterwards Frederick William withdrew from this war with France, in which he had been the most active promoter. Then followed a second and a third partition of Poland (1793, 1795), by which Prussia acquired a considerable accession of territory. By the treaty of

Basel, concluded in 1795 with the French Republic, Prussia openly abandoned her connection with the other European powers, and in a secret treaty of the following year France was permitted to advance her frontier to the Rhine, while a new line of neutrality was formed by which Saxony and other South German states withdrew their support from the empire. Frederick William died in 1797, and was succeeded by Frederick William III. Continuing his father's policy in regard to France, he courted the French directorate, and at the Peace of Lunéville (1801) Prussia was indemnified by 4116 square miles ceded at the expense of the empire. In 1804 Prussia recognized Napoleon as Emperor of France, and in the campaign which ended in the overthrow of Austria at Austerlitz (1805) remained neutral. This attitude was at first successful, but ultimately it led to distrust among the German states, and by the formation of the Confederation of the Rhine Prussia was isolated and left to the mercy of Napoleon. At the instigation of the latter Prussia had occupied Hanover, but Napoleon treated this fact with contemptuous indifference when he offered to restore Hanover to England. In his indignation at this insult Frederick William declared war against France without an ally. Although the Prussian army numbered 180,000 men, the French emperor was able to put a larger force in the field. On October 14, 1806, the armies met at Jena and Auerstädt, where the Prussians were completely defeated, and the whole country was soon in the hands of Napoleon, who entered Berlin in triumph. At the Peace of Tilsit (June, 1807), concluded between Prussia and Napoleon, all lands between the Rhine and the Elbe were ceded to Napoleon for his free disposal, a war indemnity of 140,000,000 francs was imposed on the mutilated kingdom, and Frederick William was also put under treaty obligation not to maintain an army of more than 42,000 regular troops during the next ten years. The years which followed this national disaster were chiefly remarkable for the sweeping internal reforms which the crisis necessitated, carried out under Baron Stein and Baron Hardenberg, and almost amounting to a revolution. The restriction of the army to 42,000 was evaded by replacing rapidly the drilled men by another body of undrilled men. Thus, after Napoleon's disastrous Russian campaign of 1812, Prussia was prepared to take prompt advantage of her opportunity. The king issued a general call to arms, and 150,000 men at once responded. A treaty with Russia was concluded at Kalisch, and the league thus formed was joined afterwards by Austria. In the great struggle for the overthrow of Napoleon which followed (see *France*), an important part was taken by the Kingdom of Prussia, and the Prussian troops were similarly important in the Waterloo struggle. At the Congress of Vienna (1815), when the map of Europe was rearranged, Prussia, though losing some possessions, was indemnified with others more extensive and valuable, and was placed in a more advantageous position than before. She now also formed one of the states in the new German Confederacy.

After the restoration, Frederick William III leaned to the despotic counsels of Austria and Russia, supported heartily the Holy Alliance, and entered upon a reactionary policy which continued until his death in 1840. He was succeeded by Frederick William IV, who was expected to grant a constitution to his subjects, but refused the demand of his states to this effect in 1841. In 1847 he tried to anticipate the revolutionary movement spreading throughout Europe by summoning a combined meeting of provincial parliaments at Berlin, but he conferred on them no real power. In the following year, however, after a deadly struggle, in which Berlin was declared in a state of siege, the king dismissed his ministers, and granted a constitution, the details of which were elaborated by a new parliament, and which was formally proclaimed in 1850. The Poles in 1848 revolted against Prussian rule, but the movement was summarily suppressed. In 1848 a deputation of the German national assembly at Frankfort offered the crown of Emperor of the Germans to the King of Prussia, but it was declined. By this time two parties existed in the Germanic Confederacy, one of them desiring Prussia to be the chief state in Germany, to the exclusion of Austria altogether; henceforth there was a strong rivalry between these two states. In 1857, the king being unable to conduct affairs by reason of mental illness, his brother William became regent, and ultimately succeeded to the throne on the death of Frederick William in 1861.

The new king, William I, showed a disposition to absolutism, which in 1862-63 occasioned a lengthened dispute between the chambers and the ministry under Count Bismarck. At this time, on the complaint of the Federal Diet that Denmark had not observed its treaty

obligations in regard to the duchies of Schleswig and Holstein, the Prussians, under General Wrangel, entered Schleswig (1864), and Denmark was overpowered. By the Treaty of Vienna, signed October 30, 1864, Denmark gave up Schleswig, Holstein, part of Jutland, and Lauenburg to Germany. In the following year Prussia purchased the claims of Austria over the Duchy of Lauenburg, and it was agreed that Schleswig and Holstein should be administered separately by both powers. But this settlement did not last long. Prussia, which had determined on appropriating them, wished to buy out Austria, but the latter would not cede her claims for money. This led to war between the two powers and to the break-up of the German Confederation, some of the states of which sided with Prussia, others with Austria. On June 15, 1866, the Prussian troops took the offensive, and the brief campaign which ensued is known as the Seven Weeks' war. The Prussian forces were armed with the new needle-gun, and the whole movements were directed by the chief of staff, Count von Moltke. The Austrians, under General Benedek, were completely defeated near Königgrätz in Bohemia, where on July 3d was fought the decisive battle of Sadowa; and peace soon followed. A subordinate campaign against Hanover, Bavaria, and other states had been conducted by the Prussians with complete success. After the war Prussia incorporated Hanover, Hesse-Cassel, Nassau, Hesse-Homburg, Schleswig, Holstein, Lauenburg, Hesse-Darmstadt north of the Main, and the principality of Hohenzollern, which already belonged to the royal family. The King of Prussia now invited the States of North Germany to form a new confederation, which was established on the basis of proposals made by Prussia. The jealousy of France was excited by this powerful confederation, and in 1867 the question of the disposal of Luxemburg brought France and Prussia almost to the point of war. In 1870 Prince Leopold of Hohenzollern consented to become a candidate for the then vacant Spanish throne. This was opposed by the French emperor, who demanded not only that the candidate should withdraw, but that the King of Prussia should pledge himself not to permit any such future candidature. This being refused, war was declared by France on July 15, 1870, with a most disastrous result to herself. (See *Franco-German War.*) After the German arms had proved entirely successful, on the invitation of the North German parliament supported by the South German states, the King of Prussia assumed on January 18, 1871, the title of German Emperor.

From this point the history of Prussia is, to a great extent, merged in that of the German Empire. In the hands of Prince Bismarck, acting as premier of Prussia as well as chancellor of the empire, a strong, central, autocratic government was maintained. Externally his policy was to secure Germany from attack by France or Russia, and in order to this alliances were made with Austria and Italy. Internally the legislation of Prussia has been chiefly remarkable in recent years for its anti-clerical and anti-social laws. In 1873 many clerical privileges were suppressed by the laws introduced and carried by M. Falk; but in 1880 an amendment to these was promoted by the premier, and later he greatly modified his opposition to the ultramontanes. The social-democrats also evoked the special antipathy of the Prussian premier, and their success at the elections, especially in Berlin, caused him to promote an anti-social law, which was vigorously applied. In his policy, both home and foreign, Prince Bismarck was supported by the Emperor William I until the death of the latter in March, 1888. He was succeeded by his son, Frederick III, who, when he ascended the throne, was struggling with a deadly throat disease. When he died in June, 1888, he was succeeded by his son, William II, who showed himself to be a ruler with a mind and will of his own. In March, 1890, Bismarck retired from his offices, and was succeeded in the chancellorship by General von Caprivi. The history of Prussia need not be carried any farther, as it is in no special sense distinct from that of Germany (which see).

Prussian Blue (prush'an), a cyanide of iron (Fe_7Cy_{18}) possessed of a deep-blue color, and much used as a pigment. It is also used in medicine.

Prussian Brown, a color obtained by adding a solution of the yellow prussiate of potash to a solution of sulphate of copper, which throws down a precipitate of deep brown. This, when washed and dried, is equal to madder, and possesses greater permanency.

Prussic Acid (prus'ik), called also *hydrocyanic* or *cyanhydric acid* (HCN), was discovered by Scheele in 1782, but first prepared in the pure state by Gay-Lussac in 1811. It is a colorless liquid which solidifies at 5° F.

to feathery crystals, and boils at 80°. Its specific gravity is about 0.7. It dissolves in all proportions in water, forming a liquid which reddens litmus-paper but slightly. It is found in the kernels of bitter almonds, peaches, apricots, plums, cherries and quinces; the blossom of peaches, sloes, etc.; the leaves of the beech, cherry, laurel; and various parts of other plants. Pure prussic acid is prepared by passing a stream of dry sulphuretted hydrogen over dry cyanide of mercury. This acid, which is one of the strongest poisons known, is used medicinally to remove various forms of irritation; but in all cases it must be used with extreme caution. When an overdose is administered death is instantaneous, and with a lesser dose the symptoms are convulsions or paralysis. The nature of its action is not clearly understood, but the best antidotes are found to be ammonia, chlorine-water, or a subcutaneous injection of atropine. See *Cyanogen*.

Pruth (pröth), a river of Europe which rises on the eastern side of the Carpathian Mountains, in the southeast of Galicia, flows circuitously east past Czernowitz, then S. S. E., forming the boundary between Roumania and the Russian government of Bessarabia, and enters the Danube on the left, about 12 miles below Galatz.

Prynne (prin), WILLIAM, pamphleteer and politician, born at Swanswick, Somersetshire, in 1600, and educated at Oxford, where he took his degree in 1620. He then removed to Lincoln's Inn, where he became a barrister, and in 1627 began with Puritan severity to attack prevailing fashions. For a volume denouncing stage-playing, entitled *Histrio-Mastix*, which was supposed to be leveled at the queen, he was condemned by the Star-chamber to pay a fine of £5000, to stand in the pillory and have both ears cut off, and to remain a prisoner for life. While in prison he wrote another book, *News from Ipswich against Laud*, and being condemned again to another fine of £5000, and to lose the remainder of his ears, had the stumps cut off, and was branded on both cheeks. The Long Parliament in 1640 granted his release. Soon after he entered Parliament and took a prominent part in the trial of Laud. After the fall of Charles I Prynne opposed Cromwell, who had him again imprisoned. At the Restoration he was appointed keeper of the records at the Tower, and died in 1669. He was a most voluminous writer. He had much learning and indefatigable industry, but was very deficient in judgment.

Prytaneum (prit-a-nē′um), a public hall in ancient Greek states and cities serving as the common home of the community. That of Athens was the most famous. Here the city exercised the duties of hospitality both to its own citizens and strangers. The prytanes or presidents of the senate were entertained in it, together with the citizens who, whether from personal or ancestral services, were honored with the privilege of taking their meals at the public cost.

Przemysl (prshem′isl), a town of Austrian Galicia, on the river San, 51 miles west of Lemberg, and 140 east of Cracow. It has two ancient cathedrals and several cloisters; and has recently been strongly fortified. Pop. 46,295, nearly two-thirds Poles and about one-third Jews.

Przhevalski, or PRJEVALSKI (pzhā-vål′ske), COLONEL N., a Russian traveler, born in 1839. He became an army officer and was employed on numerous and important government exploring expeditions, usually accompanied by an armed force. The results of his explorations in Asia are of the highest value. He died in 1888.

Psalmanazar (sal-ma-nā′zar), GEORGE, the assumed name of a literary impostor, born of Catholic parents in the south of France about 1679; died in 1763. He studied among the Dominicans, acted as a private tutor; became a common vagrant, and at length assumed the character of a Japanese convert to Christianity, a character which he changed to that of a converted heathen native of the island of Formosa. At this time he became acquainted with a clergyman named Innes, who brought him to London as a convert to the Church of England. Under the patronage of Bishop Compton he translated the Church Catechism into a language which he invented and called Formosan, while he also published a so-called authentic *History of Formosa*. Various scholars had doubts of his pretensions, and at last he confessed his imposture. For many years after he resided in London, and employed his pen in writing for the booksellers. His *Autobiography*, published after his death, expresses great penitence for his deceptions. Dr. Johnson had a high opinion of his character and abilities.

Psalmody (sä′mu-di, sal′mu-di), the art and practice of singing psalms. The composition of psalm tunes

and the performance of psalmody appears to have been practiced and encouraged in Germany, France, and the Low Countries before it was introduced into Britain. In France psalmody was popularized at the Reformation by Clement Marot and Claude Goudimel, the former of whom translated the *Psalms of David* in verse, while the latter set them to music. Psalm-singing was introduced by the Reformers; but Calvin discouraged any but simple melody, while Luther practiced and favored part harmony, as did also John Knox in his psalter. The first English version of the *Psalms of David*, which appeared soon after that of the French, was made in the reign of Henry VIII, by Thomas Sternhold, groom of the robes to that monarch, and John Hopkins, a schoolmaster, assisted by William Whittyngham, an English divine. It was afterwards superseded by the version of Nahum Tate, the poet laureate, and Dr. Nicholas Brady. The first important compilation of psalm tunes for four voices was published in 1621 by Thomas Ravenscroft, Mus. Bac., and included such well-known tunes as *Bangor*, *St. David's*, *Norwich*, *York*, etc. Sternhold and Hopkins' version of the *Psalms* was first used in Scotland, and was afterwards superseded by the version now in use, founded on that of Francis Rous, provost of Eton, a member of Cromwell's government.

Psalms (samz), Book of, one of the books of the Old Testament, containing the liturgical collection of hymns used by the Jews in the temple service. Each psalm in the collection, with a few exceptions, has a particular superscription, such as *Maschil*, instruction, *michtam*, memorial, etc. The chronology of the psalms is much disputed. The earliest (Psalm xc) is said to have been written by Moses, many are attributed to David, a few are supposed to have been written on the return from the captivity, and some are assigned to the time of the Maccabees, but evidence as to their actual origin is greatly lacking. There is an ancient division of the psalms into five books, viz. i-xli; xlii-lxxii; lxxiii-lxxxix; xc-cvi; cvii-cl, which many critics look upon as indicating five distinct collections. Those who take this view place these collections in chronological order as they stand; but this method is considered by the latest criticism to be unwarranted by the internal evidence of each particular psalm. Nearly eighty are popularly assigned to David, twelve to the singer Asaph, some fourteen to the sons of Korah, two have the name of Solomon, and one is supposed to have been written by Moses. The opinion that some of the psalms are of the time of Samuel has no historical authority, while those by unknown authors are apparently of the latest date. In the Old Testament there are 150 psalms, but in the Septuagint and Vulgate psalms ix and x and civ and cv are united, while cxvi and cxlvii are divided, so that the numbering differs from the English version. In structure the psalms have the strophe and antistrophe which is so characteristic of Hebrew poetry. It would also seem that many of them were meant to be sung in parts, the chief part by the officiating priest, and a responsive part by the people. The *Book of Psalms* as we have it is essentially the hymn-book of the second temple, and according to the latest criticism, was ascribed to David, merely because the order of the worship in the second temple was the same as that prescribed by him for the first temple.

Psalter (sạl'tėr), specifically, the version of the Psalms in the *Book of Common Prayer;* also applied in the Roman Catholic Church to a series of devout sentences, 150 in number, and to a large chaplet or rosary with 150 beads, agreeing with the number of the psalms.

Psaltery (sạl'tėr-i), or Psalterion, an instrument of music used by the Hebrews, the form of which is not now known. That which is now used is a flat instrument in the form of a trapezium or triangle truncated at the top, strung with thirteen chords of wire, mounted on two bridges at the sides, and struck with a plectrum or crooked stick, thus resembling the dulcimer (which see).

Psammetichus (sam-met'i-kus), a king of Egypt who died about 617 B.C. He was one of the twelve kings who reigned simultaneously in Egypt for fifteen years after the expulsion of the Æthiopian dynasty; but being suspected by the other kings of aiming at sole sovereignty he was driven into banishment. With the aid of some Greek mercenaries, however, he defeated the other kings in a battle fought at Momemphis, on the east side of Lake Mareotis, after which he became the sole king of Egypt (671 or 670 B.C.), and the founder of a new dynasty.

Psara, now Ipsara (*Psyra*), an island of Turkey, in the Grecian Archipelago, 7 miles northwest of Scio, about 5½ miles in length, and as many in breadth.

Pseudepigrapha (sū-de-pig'ra-fa; Greek, false additional writings), a term applied in bib-

liography to a great number of books and fragmentary writings whose claim to a place in the Old and New Testament canons has been denied. Unlike the apocryphal and deutero-canonical books, the pseudepigrapha have no value unless to prove the capacity for forgery which was possessed by the Jew, Gnostic and Christian of ancient and mediæval times. Among these Old Testament forgeries may be mentioned, *The History of Asenath*, *The Preaching of Noah*, *The Book of Elias*, *The Testament of the Twelve Patriarchs*, *The History of Antiochus*, *Book of Lamech*, *Apocalypse of Adam*, etc.; while among the New Testament books are the false gospels of *James*, *Matthias*, *Thomas*, *Nicodemus*, *Andrew*, *History of Joseph the Carpenter*, *Nativity of Mary*, *Acts of the Apostles*, etc.

Pseudomorph (sū′dō-morf), a mineral having a definite form, belonging not to the substance of which it consists, but to some other substance which has wholly or partially disappeared. Sometimes quartz is found in the form of fluorspar crystals, the fluorspar having been changed by a process of replacement or substitution into quartz.

Pseudopodia (sū-do-pō′di-a), in zoology, the organs of locomotion characteristic of the lower Protozoa. These consist of variously-shaped filaments, threads, or finger-like processes of sarcode, which the animal can thrust out from any or every part of its body. See *Protozoa*.

Psid′ium. See *Guava*.

Psittacidæ (sit-as′i-dē), the parrot tribe, a family of scansorial birds, comprising over 300 species, of which the genus *Psittăcus* is the type. See *Parrot*.

Pskov (pskof), or PLESKOV, a government of Russia, bounded by those of St. Petersburg, Novgorod, Tver, Smolensk, Vitebsk, Livonia; area, 17,069 square miles. The whole government belongs to the basin of the Baltic, the South Dwina, which drains the southeast, carrying its waters into the Gulf of Riga, and the Velikaia, Chelon and Lovat, with other small tributaries, carrying the rest of the drainage into the Gulf of Finland. The soil is throughout of poor quality, wheat is seldom grown, and the principal crops are oats and barley. Forests are extensive, and the pine furnishes the means of manufacturing large quantities of pitch. Pop. 1,136,540.— PSKOV, or PLESKOV, the capital, is situated on the Velikaia, on which there is regular communication by steamer with Dorpat. It consists of the Kremlin, the Central city, the Great city, and a considerable suburb. Among the chief buildings are the cathedral, and the palace of the ancient princes of Pskov, now occupied by the archbishop. The principal manufacture is Russian leather. Pop. 30,424.

Psoas (sō′as), an important muscle of the human body which extends from the lumbar region to the thigh-bone, and assists in the movements of the thigh.

Psoralea (so-ra′le-a), a genus of leguminous plants, one species of which (*P. esculenta*) is the breadroot of N. America.

Psoriasis (sō-rī′a-sės), a kind of skin disease, in which elevated red patches appear covered with large scales, there being often cracks or fissures between, from which blood may ooze. In some cases it is a syphilitic affection. The name is also given to the itch.

Psyche (sī′kē; Greek, *psychē*, the soul), a sort of mythical or allegorical personification of the human soul, a beautiful maiden, whose charming story is given by the Latin writer Appuleius. She was so beautiful as to be taken for Venus herself. This goddess, becoming jealous of her rival charms, ordered Cupid or Love to inspire her with love for some contemptible wretch. But Cupid fell in love with her himself. Many were the trials Psyche underwent, arising partly from her own indiscretion, and partly from the hatred of Venus, with whom, however, a reconciliation was ultimately effected. Psyche by Jupiter's command became immortal, and was for ever united with her beloved.

Psychical Research (sī′ki-kal), SOCIETY FOR, an English society, founded in 1882, 'for the purpose of making an organized attempt to investigate that large group of debatable phenomena designated by such terms as mesmeric, psychical, and spiritualistic.' This society in its early period gave its chief attention to *telepathy* (or the power of one mind to influence another mind at a distance and without the usual organs of sense), the results of which have been published in *Reports* and *Proceedings*, as well as in a book called *Phantasms of the Living*. In its more recent period the investigation of spiritualistic phenomena has been very prominent in the work of the society, and especially the study of the manifestations of Mrs. Piper, an American medium who for many years was under careful investigation by prominent members of the society. Of these, many members of high standing have accepted the theory of

spiritualism, including such distinguished scientists as Sir William Crookes, Alfred Russell Wallace, Sir Oliver Lodge. Frederick W. H. Myers, Prof. William James, and others. The doctrine of telepathy is maintained as proved by the society. The character of the membership of this society has given much prominence to its conclusions, and has placed the investigation of psychical phenomena on a new and higher plane. It has branches in several of the cities of this country.

Psychology (sī-kol'u-ji) is the science or department of philosophy which deals with the phenomena of mind. See *Mind*, *Metaphysics*, *Philosophy*.

Ptarmigan (tär'mi-gan), a bird of the grouse family (Tetraonidæ), distinguished from the true grouse by having the toes as well as the tarsi feathered. The common ptarmigan (called also *white grouse*) is the *Lagōpus vulgāris*. The male is about 15 inches long, the female about an inch less. In summer the predominant colors of its plumage are speckled black, brown, or gray, but in winter the male becomes nearly pure white, and the female entirely so. In Britain it is to be met with only on the summits of some of the highest Scottish hills, chiefly amid the Grampians, in the Hebrides and Orkneys, and sometimes but rarely in the lofty hills of Cumberland and Wales. The willow-ptarmigan or willow-grouse (*L. salicēti*) occurs in great abundance in the Arctic regions of America and in Norway, whence great numbers are sent to the London market.

Pterichthys (te-rik'this), a fossil genus of fishes belonging to the Old Red Sandstone. The head and forepart of the body were protected by a buckler of large ganoid plates fitting closely to each other. The caudal portion was free and seems to have been covered with small, round, enameled scales. The pterichthys was peculiarly characterized by the form of its pectoral fins, which were in the form of two long, curved spines, something like wings (whence the name —'wing-fish'), covered by finely tuberculated ganoid plates. They appear to have been used for defense as well as progression.

Pteris (tėr'is), the genus of ferns to which the bracken belongs.

Pterocarpus (ter-u-kar'pus), a genus of leguminous plants, species of which yield kino, dragon's blood, red sandal-wood, etc.

Pteroceras (ter-o'se-ras), a genus of molluscs inhabiting the Indian Ocean; the scorpion-shells. The head of the animal is furnished with a proboscis and two tentacula, which are short. The shell is oblong, the spire short, and the operculum horny. *P. scorpio* is known by the name of the *devil's claw*. At the least ten recent and twenty-seven fossil species of this genus are known.

Pterodactyl (ter-o-dak'til; 'winged finger'), a genus of extinct flying reptiles of the order Pterosauria, found in the Jura Limestone formation, in the Lias at Lyme-Regis, in the Oölite slate of Stonefield, etc. The pterodactyls had a moderately long neck, and

1, Pterodactyl (restored). 2, Skull of *Pterodactylus longirostris*.

a large head; the jaws armed with equal and pointed teeth; most of the bones, like those of birds, were 'pneumatic,' that is, hollow and filled with air; but the chief character consisted in the excessive elongation of the outer digit (or little finger) of the forefoot, which served to support a flying membrane. A number of species have been discovered, most of them small or of moderate size, but one must have had an expanse of wing of at least 20 feet.

Pteromys (ter'o-mis). See *Flying squirrel*.

Pteropidæ (ter-op'i-dē), a family of cheiropterous mammals, called fox-bats, from their long and pointed fox-like head. The type genus is Pteropus. See *Fox-bats*.

Pteropoda (ter-op'o-da), a class of molluscs, comprehending those which have a natatory, wing-shaped expansion on each side of the head and neck, being thus a sort of 'winged snails.' They are all of small size, are found floating on the surface of the ocean in all parts of the world, and in the Arctic and Antarctic regions furnish much of the food of the whale. They are all her-

maphrodite. Their food consists of minute animals.

Pterosauria (ter-o-sạ′ri-a), an extinct order of reptiles, represented chiefly by the Pterodactyls (which see). This group is especially noted as containing forms which possessed the power of flight.

Pterygotus (ter-i-gō′tus), a gigantic fossil crustacean occurring chiefly in the passage-beds between the Silurian and Devonian systems. It has a long, lobster-like form, composed in the main of a cephalo-thorax, an abdominal portion of several segments, and a somewhat oval telson or tail-plate.

Pthah, or PHTHA (ftha), an ancient Egyptian divinity, the creator of all things and source of life, and as such father and sovereign of the gods. He was worshiped chiefly at Memphis under the figure of a mummy-shaped male, and also as a pygmy god.

Ptolemaic System (tol-e-mā′ik), in astronomy, that maintained by Claudius Ptolemy, the astronomer, who supposed the earth to be fixed in the center of the universe, and that the sun and stars revolved around it. This long-received theory was eventually rejected for the Copernican system. See *Astronomy*.

Ptolema′is. See *Acre*.

Ptolemy (tol′e-mi; PTOLEMAIOS), the name of a line of Græco-Egyptian kings, who succeeded, on the division of the empire of Alexander the Great, to the portion of his dominions of which Egypt was the head. They were also distinguished by the surname Lagidæ, from Ptolemæus Lagus, the founder of the dynasty. PTOLEMY I, called *Soter*, the Savior, was by birth a Macedonian. His mother was Arsinoë, the mistress of Philip, and his father is commonly reputed to have been Lagus, a Macedonian of humble birth. Ptolemy was one of the intimate friends of Alexander, attended the king on his expedition to Asia, was admitted into the bodyguard, and in 329 B.C. commanded one of the chief divisions of the army. On the death of Alexander he attached himself to the party of Perdiccan, and secured for himself the government of Egypt. He married Eurydice, daughter of Antipater, and in B.C. 320 he seized the satrapy of Phœnicia and Cœle-Syria. In 308 he invaded Greece, and proclaimed himself as a liberator; but he made little progress, and having garrisoned Corinth and Sicyon, which he lost some years later, he returned to Egypt. Antigonus resolved to wrest Cyprus from Ptolemy (B.C. 307), and in a sea-fight at Salamis the Egyptians were defeated, and Cyprus fell into the hands of the victor, who assumed the title of king. Antigonus now advanced against Egypt through Syria with a powerful army, supported by a fleet; but he was ultimately compelled to retire, while a few years later Cyprus was recovered and became a permanent dependency of Egypt. Ptolemy died in B.C. 283. He was a great patron of art, learning, and literature, and founded the celebrated Alexandrian library.— PTOLEMY II (*Philadelphus*), born B.C. 309, succeeded his father, and reigned in almost complete peace. His chief care as ruler was directed to the internal administration of his kingdom. He spared no pains to fill the library of Alexandria with all the treasures of ancient literature, and among the architectural works erected during his reign were the lighthouse on the island of Pharos, the Alexandrian Museum, and the royal burying-place. He founded numerous cities and colonies, and during his reign the dominion of Egypt extended into Ethiopia, Arabia, and Libya, and embraced the provinces of Phœnicia and Cœle-Syria, besides tracts in Asia Minor and some of the islands of the Mediterranean. Ptolemy died in 247, and was succeeded by his son — PTOLEMY III, surnamed *Euergĕtes* ('benefactor'). He was early engaged in an important war against Syria, in which he advanced without opposition to Antioch, then turned eastward, subduing Mesopotamia, Babylonia, etc. The fleets of Ptolemy had at the same time subdued the coasts of Asia Minor, and carried his arms to the Hellespont and to the coast of Thrace. Ptolemy took some part in the affairs of Greece against the rulers of Macedonia, and maintained friendly relations with Rome. Like his predecessors, he was the patron of scholars, and his court was the resort of the most distinguished men of his day. He died in B.C. 222, being succeeded by PTOLEMY IV, surnamed *Philopator*. His Syrian possessions having been gradually wrested from him by Antiochus the Great, Ptolemy put himself at the head of a large army and completely defeated Antiochus at Raphia, in B.C. 217. In later life he gave himself

Ptolemy I.— Antique gem.

up completely to debauchery, and died B.C. 205.— PTOLEMY V (surnamed *Epiphănes*), his son and successor, was under five years old at his father's death, and this led Philip of Macedon and Antiochus III (the Great) of Syria to combine to dispossess Ptolemy, and divide his dominions. To avert this danger the guardians of the young king placed him under the protection of Rome, which thus had first an occasion for interfering in the affairs of Egypt. Ptolemy was poisoned B.C. 181.— PTOLEMY VI (surnamed *Philomētor*) was a child at the death of his father. His reign was much disturbed by the rivalry of a brother, and being expelled from Alexandria he repaired to Rome B.C. 164, by whose intervention he was replaced. He died in B.C. 146. During the reigns of the succeeding Ptolemies the influence of the Romans in Egypt gradually increased, with a corresponding decrease in the independence of the native sovereigns. The personal character of the Ptolemies also degenerated, a fact to be probably connected with the common practice in the family for brothers to marry sisters.— PTOLEMY XI (*Aulētēs*, 'flute-player') was driven from his kingdom by his subjects, who were ground down by taxation; but he was restored by the Romans (to whom he gave great sums of money), and died B.C. 51.— PTOLEMY XII (*Aulētēs*), son of the preceding, reigned jointly with his sister Cleopatra till B.C. 48, when Cleopatra was expelled and, raising an army in Syria, invaded Egypt. On the arrival of Cæsar, Cleopatra by her charms acquired an ascendency over him. Ptolemy put himself at the head of the insurgents, was defeated by Cæsar, and drowned in attempting to make his escape, in B.C. 48 or 47.— PTOLEMY XIII (*Aulētēs*), the youngest son of Ptolemy XI, was declared king by Cæsar in conjunction with his sister Cleopatra in B.C. 47. He was married to his sister, but being only a boy possessed no more than the name of husband or king. Cleopatra caused him to be put to death, and the line of the Ptolemies ended when Cleopatra perished by her own hands after Octavius defeated Antony at Actium, and Egypt became a Roman province, B.C. 30.

Ptolemy (CLAUDIUS PTOLEMÆUS), a Greek astronomer and geographer of the second century after Christ. He appears to have resided in Alexandria, where he made astronomical observations in 139, and he was alive in 161. Ptolemy's great astronomical work is entitled *Megalē Syntaxis tēs Astronomias*, and is more commonly known by the Arabic title *Almagest*. His system, founded on the apparent movements of the heavenly bodies, and which is still known by his name, was finally superseded by that of Copernicus. See *Ptolemaic System*, *Astronomy*.

Ptomaine (tō'ma-in, mān), one of a class of alkaloids or organic bases, which are generated in the body during putrefaction, during morbid conditions prior to death, and even, it is said, during normal healthy conditions of life. It is considered highly poisonous, and has been mistaken for strychnine and other vegetable poisons by toxicologists.

Puberty (pū'ber-ti), the period in both male and female marked by the functional development of the generative system. In males it usually takes place between the ages of thirteen and sixteen; in females somewhat earlier; and, as a rule, in very warm climates puberty is reached somewhat sooner than elsewhere. In males puberty is marked externally by the deepening of the voice, the first appearance of the beard, greater firmness, fullness of the body, etc.; in females, by the enlargement of the breasts and by the general rounding out of the frame, and most unequivocally of all by the commencement of menstruation.

Publicans (pub'li-kanz), PUBLICANI (from *publicus*, belonging to the state), the farmers of the taxes levied in the territories of ancient Rome. Naturally they belonged to the wealthier classes, and were from their functions unpopular. Far more unpopular were the subordinates whom they employed to collect the taxes for them. In Palestine, from the strong spirit of nationality among the Jews, many of whom denied the lawfulness of paying tribute, these were specially obnoxious as the agents of the foreign rulers. To this detested class, and not to the *publicani* proper, the 'publicans' of the New Testament generally belonged.

Public Houses. See *Inn* and *License*.

Publicist (pub'li-sist), a term originally applied to a writer on international law, now used to denote a writer on current politics.

Public Lands. The United States possessed originally a vast area of public lands, the property of the government, added greatly to by every accession of territory, and given very freely to settlers for the purpose of development. Large quantities of these lands have also been donated to railroads, as in the instance of the Central Pacific. In 1860 the public domain included 1,055,911,288 acres. In addition to homestead

Domestic Science Class

Class in Banking

Sewing Class

Cabinet Shop

SCENES IN THE EMERSON PUBLIC SCHOOL AT GARY, INDIANA

In this school, under the able direction of Superintendent William Wirt, the most practical methods of training are employed, and vocational training is strongly emphasized.

and railroad grants, much of this was given to new states, when admitted, for school and other purposes. In 1912 there remained, not including Alaska, 327,389,968 acres. Much of this remaining land is arid or semi-arid, yet the extension of irrigation has rendered a considerable portion of it suitable for agricultural purposes, and the area of settlement has increased in consequence. Recently the discovery of valuable coal, phosphate, petroleum and other deposits in the unsettled territory, and of sites suitable for water-power development, has led the government to withdraw large tracts from entry, under the newly developed idea that these treasures of the earth belong to the nation at large and should be held in the interest of all the people. Withdrawals of coal lands made during the administration of President Roosevelt amounted to 14,374,695 acres, and were added largely to by President Taft. The total withdrawal of coal lands, in addition to the large area withdrawn in Alaska, amounts to 36,073,164 acres, distributed through North Dakota, South Dakota, Colorado, Utah, Washington and Arizona. Other large withdrawals made by President Taft, under an act of Congress of 1910, were as follows: water-power sites, 1,454,499 acres, phosphate sites, 2,594,113 acres, and petroleum sites, 4,447,119 acres. This action has been taken to prevent these very valuable lands from being pre-empted by speculators, and awaiting legislation regarding their disposal. If handled in the public interest they may add enormously to the revenue of the government.

Public Library. See *Library.*

Public Schools, the schools established under any national system of education. In the United States the administration, organization and support of these schools depend upon the State Legislatures and city councils. Boards of Education in many States and cities have special charge of the schools. Three grades are commonly recognized — the primary, grammar, and high. Normal schools for the training of teachers are established in nearly all the States. The public schools of this country have made marked progress since their first institution less than a century ago, and are now in many cities in a high state of efficiency. Public school systems prevail in many of the countries of Europe, those of Germany being the most celebrated for their efficient management. They are of late introduction in the British Islands, where elementary education has long been under church control.

Publius Syrus (pub'li-us; more correctly PUBLILIUS), so-called because a native of Syria, was carried as a slave to Rome about the middle of the first century B.C., and became there a popular writer. His master gave him a good education, and afterwards set him free. He excelled in writing *mimi*, or farces, which were interspersed with moral sentences, and a collection of them was used by the Romans as a schoolbook. A number of apothegms, not all composed by him, have been published as *Publii Syri Sententiæ.*

Puccinia (puk-sin'i-a), a genus of fungi well known to farmers under the name of mildew. The rust, otherwise the mildew, of corn, is the *P. graminis.*

Puccini (pöt-chēn'ē), GIACOMO, Italian composer, born in Lucca, Italy, in 1858. He first came into public notice through his opera, *La Boheme* (1896). Other of his operas are, *Madame Butterfly* and *La Fanciulla del West.*

Puccoon'. Same as *Blood-root.*

Puck, a celebrated elf, the 'merry wanderer of the night,' whose character and attributes are depicted in Shakespere's *Midsummer Night's Dream,* and who was also known by the names of *Robin Goodfellow* and *Friar Rush.* He was the chief of the domestic fairies, and many stories are told of his nocturnal exploits.

Pückler-Muskau (puk'ler mös'kou), HERMANN LUDWIG HEINRICH, PRINCE OF, a German traveler and author, was born in 1785. He served in the Tuscan and Russian armies, and after the peace of 1815 devoted himself to literature, landscape gardening, and travel. One of his works was translated into English by Mrs. Austin as *Tour in England, Ireland, and France by a German Prince.* Other English translations of works by him are *Semilasso in Africa,* 1837; *A German Sketch-Book* (Tutti Frutti), 1839; and *Egypt under Mehemed Ali,* 1845. He died in 1871.

Pudding-berries, the berries of the Canadian dogwood (*Cornus Canadensis*), common throughout North America.

Pudding-stone, or PLUM-PUDDING STONE, a term now considered synonymous with conglomerate, but originally applied to a mass of flint pebbles cemented by a siliceous paste. When select specimens are cut and polished they resemble a section of a plum pudding, and are used for ornamental purposes. It is very common in and around Boston, Massachusetts.

Puddling Furnace. See *Iron.*

Pudsey (pud'zi), a town in the West Riding of Yorkshire, 6 miles west of Leeds. Woolen and worsted manufactures are extensively carried on, and there is also a large manufacture of boots and shoes. Pop. (1911), 14,027.

Puebla (pweb'la), in full LA PUEBLA DE LOS ANGELES, the capital of a Mexican state of the same name, situated on a plateau 76 miles S. E. of Mexico. It has spacious streets and solidly-built houses, the cathedral being a magnificent structure. It contains a large number of religious edifices, many of them highly decorated. There are also several colleges, a museum, and a theater. It is one of the chief seats of Mexican manufacturing industry, and its chief products are cotton and woolen goods, leather, glass, earthenware, and soap. Puebla was built by the Spaniards in 1533-34. Pop. 93,152. The state consists of an elevated plateau, and contains much fertile soil. On the western frontier is the volcano of Popocatepetl, the highest mountain in Mexico. Area, 12,042 square miles; pop. 1,021,133.

Pueblo (pweb'lo), a city, the capital of Pueblo Co., Colorado, on the Arkansas River, 45 miles S. of Colorado Springs. It is the seat of the state insane asylum, and among its notable buildings is the State Mineral Palace. It is in the midst of an agricultural and stock-raising region and has important industrial interests, including extensive iron and steel works, smelting furnaces, boiler works, stockyards, etc. One of its smelting works is said to be the largest in the world. In the vicinity are abundant deposits of coal, iron-ore, limestone, etc. Pop. 44,395.

Pueblos, a semicivilized family of American Indians dwelling in Arizona and New Mexico. Their name is derived from *pueblo*, Spanish for 'village,' and they are peculiar in dwelling in enormous single habitations, some of them large enough to contain a whole tribe. These edifices are often 5 or 6 stories high, and from 400 to 1300 feet long, with a large number of rooms on each floor. They are commonly built of adobe, though in some cases of flat stones, and the ground floor has no doors or windows, entrance to its rooms being obtained by means of a ladder leading to the second story. Indoor ladders take the place of stairways. Each successive story recedes a few feet from the line of the one below it, thus giving the building a somewhat pyramidal aspect. Each family has a separate apartment and there are large rooms used for council chambers and tribal dances. In New Mexico there are 19 such villages, with over 8000 occupants. These till the land with much skill, irrigating their fields extensively. In addition to field crops, they raise horses, cattle and sheep. They also have the arts of spinning and weaving and pottery-making. The Moquis of Arizona are a related tribe, about 1800 in number, who live in villages built on the summit of mesas or steep, isolated hills, rendering assault by enemies difficult. These people were once far more numerous than at present, as is shown by the wide area over which the ruins of old pueblos and remains of pottery are found. They were first discovered in 1540 by Vasquez de Coronado, a Spanish adventurer, who had heard exaggerated stories of the splendor and riches of the 'seven cities of Cibola.'

Puerperal Fever (pū-er'per-al), a dangerous contagious disease peculiar to women in childbed, and due to the absorption of poisonous material by the raw surface of the womb. The poison may originate from decomposing material in the womb itself, then called *sapræmia;* but is generally introduced from without, *scpticæmia.*

Puerperal Mania, is a form of insanity developed during pregnancy or after childbirth, and is invariably the effect of exhaustion or debility.

Puerto Bello. See *Porto Bello.*

Puerto Cabello (pwar'tō kȧ-bel'-yō), or PORTO CABELLO, a seaport of Venezuela, with a very commodious and well-sheltered harbor, a well-built, thriving town. Its principal exports, mainly to the United States and Germany, are coffee and cocoa. Pop. about 14,000.

Puerto de Santa Mari'a, commonly called EL PUERTO, a town of Spain, in the province and 7 miles northeast of Cadiz, on the Guadalete, near its mouth in the Bay of Cadiz. It is a great wine-exporting place (especially sherry), with large *bodegas*, or wine-stores. One of its industries is the manufacture of liquors. Pop. 20,120.

Puerto Montt (mōnt), a seaport of Southern Chile, capital of the province Llanquihue. Pop. 4140.

Puerto Principe (prēn'sē-pā), an old town in the interior of Cuba, early in the century the seat of the central government and supreme courts of justice of the Spanish

West Indies. Its chief manufacture is cigars. It is connected by railway with its port, San Fernando de Nuevitas, and is the capital of the province of Puerto Principe, also known as Camagüey, a fertile region of 10,500 square miles area. Pop. (1907) 29,616.

Puerto Real (rē'al), a Spanish seaport in the province and 7 miles east of Cadiz. Pop. 9683.

Puerto Rico. See *Porto Rico.*

Pufendorf, or PUFFENDORF (pö'fendorf), SAMUEL, BARON VON, a German writer on the law of nature and nations, born in 1632. He studied theology and law at Leipzig and Jena, and in 1660 appeared his *Elementa Jurisprudentiæ Universalis.* In 1661 he became professor of the law of nature and of nations at Heidelberg. In 1677 he published his work *De Statu Reipublicæ Germanicæ,* which, from the boldness of its attacks on the constitution of the German Empire, caused a profound sensation. In 1670 he went to Sweden, became professor of natural law in the University of Lund, and brought out his chief work, *De Jure Naturæ et Gentium,* and in 1675 an abstract of it, *De Officio Hominis et Civis.* In 1677 Pufendorf went to Stockholm as historiographer-royal. There he wrote in Latin his vigorous vindication of Protestantism, *On the Spiritual Monarchy of the Pope,* a *History of Sweden from the Campaign of Gustavus Adolphus in Germany to the Abdication of Queen Christina,* a *History of Charles Gustavus,* and in German his *Introduction to the History of the Principal States of Europe.* In 1686 he received a summons to Berlin from Frederick William, elector of Brandenburg, a history of whom Pufendorf wrote for his son, the first king of Prussia. In 1694 he was created a baron by the king of Sweden, and in the same year he died at Berlin. There are English translations of his principal works.

Puff-adder (*Vipĕra* or *Clotho arietans*), a serpent found in South and Central Africa. Its popular name is derived from its power of puffing out the upper part of the neck when irritated or alarmed. It is very thick, attains a length of 4 or 5 feet, and is extremely venomous. The Bosjesmen poison the arrows used by them in battle with its venom.

Puff'balls, so called from their globular shape, and because if they are struck when they are ripe the dry spores fly out in powder like a puff of smoke, form the genus of fungi *Lycoperdon.* When young, and whether raw or cooked, some of them are very good eating.

Puff'birds. See *Barbets.*

Puffin (puf'in), the name for the marine diving birds of the genus *Fratercŭla.* The common puffin (*F. Arctica*) is a native of the Arctic and northern temperate regions. It can fly with great rapidity when once upon the wing. It is about a foot in length, and from the singular shape and enormous size of

Common Puffin (*Fratercŭla arctica*).

its bill, which is striped with orange upon bluish gray, is often called the sea-parrot or the coulter-neb. Their plumage is glossy black, with the exception of the cheeks and under surfaces, which are white. It breeds upon rocks and in the rabbit warrens near the sea, and lays one egg, which is white. It lives on fish, crustacea, and insects, and is a gregarious and migratory bird.

Pugaree (pug'a-rē), PUGGERIE, the name in India for a piece of muslin cloth wound round a hat or helmet to protect the head by warding off the rays of the sun.

Pugatchef (pö-gȧ-chef'), YEMELYAN, the son of a Don Cossack, was born in 1726, and became in his youth the leader of a band of robbers. During the Seven Years' war he served in the Russian, Prussian, and Austrian armies successively. Returning to Russia, he attempted to stir up an insurrection, but was arrested and imprisoned. Having made his escape, he pretended to be the murdered czar, Peter III, to whom he bore a strong personal resemblance. He was joined by numbers of the peasantry, to whom he promised deliverance from their oppression. After several considerable successes, accompanied by frightful cruelty on his part, he found himself at the head of 15,000 men, and was threatening Moscow itself when, betrayed by his followers and separated from his army, he was captured, and in June, 1775, executed at Moscow.

Pug'dog, a small dog which bears a miniature resemblance to the bulldog, and is only kept as a domestic pet.

Puget Sound (pū'jet), a large inlet, or arm of the Pacific Ocean, on the northwest coast of the State of Washington, forming the southwest continuation of Juan de Fuca Strait, with which it is connected by Admiralty Inlet. It is navigable by large ships, penetrates far into the interior, and is divided into several branches, which afford great facilities for navigation. On its shores are Seattle, Olympia, and other rising towns.

Pugilism. See *Boxing.*

Pugin (pū'jin), AUGUSTIN NORTHMORE WELBY, architect, was born in 1811, the son of Augustus Pugin (see next article), from whom he imbibed a love of Gothic architecture, to promote the revival of which became early the object of his life. In 1834 he became a Roman Catholic, and designed a large number of ecclesiastical buildings for that communion, among them a church at Ramsgate, which was built at his own expense. He assisted Sir Charles Barry in the designs for the new houses of parliament, especially in those for their interior fittings and decorations. The *Contrasts, or a Parallel between the Architecture of the Fifteenth and Nineteenth Centuries* (1836), the *True Principles of Pointed or Christian Architecture* (1841), and *The Glossary of Ecclesiastical Ornament and Costume* (1844), are among his principal works. He died at Ramsgate in 1852.

Pugin, AUGUSTUS, architectural draughtsman, father of the above, was born in France in 1762, but settled early in life in London, where for many years he acted as assistant to Nash, the architect. The revival of Gothic architecture in England was much aided by his *Specimens of Gothic Architecture* (1821-23) and others of his works. Among these were the *Picturesque Tour of the Seine* (1821) and *Specimens of the Architectural Antiquities of Normandy* (1825-28). He died in 1832. His representations of Gothic architecture, for beauty, accuracy, and thorough mastery of the subject, have never been excelled.

Pug-mill, a machine for mixing and tempering clay. It consists of a hollow iron cylinder, generally set upright, with a revolving shaft in the line of its axis, carrying a number of knives projecting from it at right angles, and arranged in a spiral manner. The clay is thrown in at the top of the cylinder, and by the revolution of the shaft is brought within the action of the knives, by which it is cut and kneaded in its downward progress, and finally forced out through a hole in the bottom of the cylinder.

Pulaski (pu-las'ki), COUNT CASIMIR, a Polish patriot and American Revolutionary officer; born in 1747. Going into exile in 1772, he came to this country and joined the patriot army in 1777. As commander of the cavalry he was killed in 1779 at the siege of Savannah.

Pulci (pul'chē), LUIGI, an Italian poet, born in 1431, lived in intimacy with Lorenzo de' Medici and his literary circle. His poem *Il Morgante Maggiore*, is a burlesque on the romantic epic. Pulci died in 1487.

Pulicaria (pū-li-kā'ri-a), a genus of plants, nat. order Compositæ, suborder Corymbiferæ. *P. dysenterica* is the common fleabane.

Pulicat (pul-ē-kat'), a town of India, in Madras Presidency, on an island 23 miles north of Madras city. Pop. about 5000.

Pulitzer (pū'lit-zėr), JOSEPH, American editor and publisher, born in Budapest, Hungary, in 1847; died in 1911. In 1864 he drifted to the United States, entered newspaper work in St. Louis and became rapidly successful. In 1833 he bought the New York *World* and made it the first successful exponent of popular journalism. Four years later he lost his sight. He endowed a school of journalism at Columbia University.

Pulley (pu̱l'i), a small wheel movable about an axle, and having a groove cut in its circumference over which a cord passes. The axle is supported by a kind of case or box called the *block*, which may either be movable or fixed to a firm support. The pulley is one of the

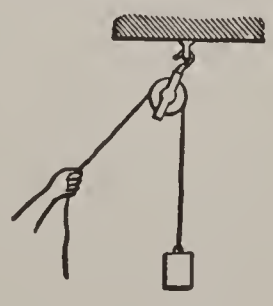


Fig. 1.

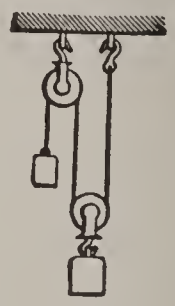


Fig. 2.

six simple machines or mechanical powers, and is used for raising weights. A single pulley serves merely to change the direction of motion, but several of them may be combined in various ways, by which a mechanical advantage or pur-

chase is gained, greater or less, according to their number and the mode of combination. The advantage gained by any combination or system of pulleys is readily computed by comparing the velocity of the weight raised with that of the moving power, according to the principle of virtual velocities. The friction, however, in the pulley is great, particularly when many of them are combined together. A pulley is said to be fixed when the block in which it turns is fixed, and it is said to be movable when the block

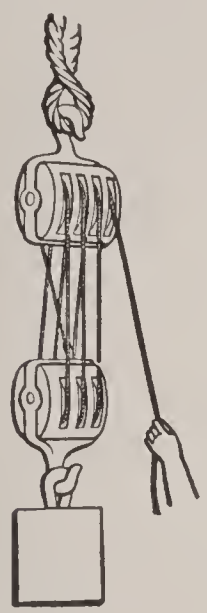


Fig. 3.

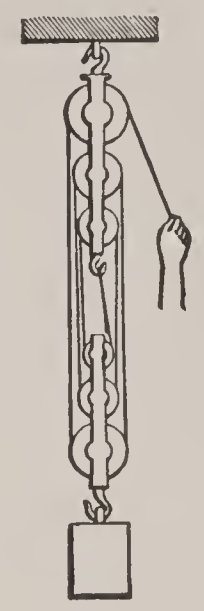


Fig. 4.

is movable. In the single fixed pulley (fig. 1) there is no mechanical advantage, the power and weight being equal. It may be considered as a lever of the first kind with equal arms. In the single movable pulley (fig. 2) where the cords are parallel there is a mechanical advantage, there being an equilibrium when the power is to the weight as 1 to 2. It may be considered as a lever of the second kind, in which the distance of the power from the fulcrum is double that of the weight from the fulcrum. In a system of pulleys (figs. 3, 4) in which the same string passes round any number of pulleys, and the parts of it between the pulleys are parallel, there is an equilibrium when the power is to the weight as 1 to the number of strings at the lower block. In a system in which each pulley hangs by a separate cord and the strings are parallel (fig. 5), there is an equilibrium when the power is to the weight as 1 to that power of 2 whose index is the number of movable pulleys (in the case here illustrated $1:2^3$ or $1:8$). Whatever be the mechanical arrangement of the pulleys and of the ropes, the principle of all pulleys is the same, namely, the transmission of the tension of a rope without sensible diminution so as to obviate the loss of force consequent on rigidity. The term pulley is used indifferently to denote either a single sheave or the complete block and its sheaves. In machinery, a pulley is a wheel, generally with a nearly flat face, which being placed upon a shaft transmits power to or from the different parts of the machinery, or changes the direction of motion by means of a belt or band which runs over it.

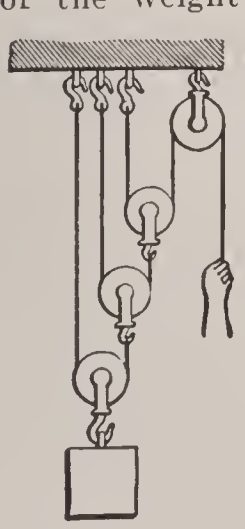


Fig. 5.

Pullman (pu̇l'man), GEORGE M., inventor, born in Chautauqua Co., New York, in 1831. At 22 he contracted for removing warehouses on the Erie canal; afterwards in Chicago for raising entire blocks of brick and stone buildings. In 1859 he made his first sleeping-car, now developed into the car known all over the world — especially adapted for sleeping in, or as a drawing-room or dining-car. The industrial town of Pullman, in the State of Illinois, was founded by him, to improve the social surroundings of his workmen. He died in 1897.

Pulmobranchiata (pul-mo-brank-i-ā'ta), an order of gasteropod molluscs (also called by some naturalists Pulmonata), in which the respiratory organ is a cavity formed by the adhesion of the mantle by its margin to the neck of the animal. The greater part of them are terrestrial, among these being the snails and slugs.

Pulmonary Consumption. See *Consumption.*

Pulmona'ta. See *Pulmobranchiata.*

Pulo-Nias, same as Nias (which see).

Pulo Penang. See *Penang.*

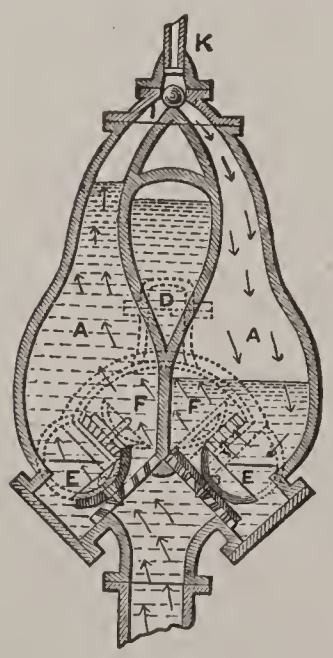
Pulpit (pu̇l'pit), the elevated enclosure or desk in a church from which the preacher delivers his discourse. The *pulpitum* of the ancient Roman theaters was that part of the stage where the actors performed.

Pulque (pu̇l'kā), or OCTLI, a favorite drink in Mexico and Central America, made from the juice of various species of agave, pleasant and harmless until after protracted fermentation, when it becomes an intoxicant. A kind of brandy is also distilled from it.

Pulse (puls), leguminous plants or their seeds, including all kinds of beans, peas, lentils, etc. The considerable proportion of nitrogen which they contain makes them very nutritious, and on that account they are much eaten, with or without rice, in India, where the chick-pea (*Cicer arietinum*) is one of these very largely used. The Hebrew word translated pulse in the authorized version of the Bible, Daniel, i, 12, 16, probably means edible seeds in general.

Pulse, the throbbing movement of the walls of blood-vessels, from the passing waves of blood due to the beats of the heart. It is limited in healthy conditions to the arteries. In the newly-born child the healthy pulse registers 130 to 140 beats a minute; at two years of age 105, at ten years about 90, at fifteen to twenty about 70; while in old age it may sink to about 60. In females it is somewhat higher than in males, and during certain fevers it sometimes reaches 140 beats per minute. In arteries which lie immediately under the skin it can be felt with the finger, as is the case with the radial artery, the pulsation of which is very perceptible at the wrist. The state of the pulse is therefore an indication of the force and frequency of the action of the heart and of the fulness of the vessels.

Pulsometer (pul-som'e-ter), an instrument of the pump kind for raising water, especially when that liquid is mixed with solid matter. It acts by the condensation of waste steam sent into a reservoir, the water rushing up into the vacuum formed by the condensation. From the accompanying figure it will be seen that it consists essentially of a double chamber, or two connected chambers, A A, having a ball-valve 1 at top (which shuts either chamber alternately) and clack-valves E E at bottom. Steam is admitted at K to one of the chambers and presses out the water contained there through F to the pipe D to be carried away. Condensation then takes place, a vacuum is formed, and the ball falls over and closes the opening through which the steam entered, and water flows up through the clack-valves and again fills the chamber. The steam in the meantime is now acting upon the water in the adjoining chamber, condensation then taking place there, the ball falls back to that side, and the operations go on alternately, the result being a steady stream of water sucked into one chamber after another, and then forced out and upwards by the steam.



Pulsometer.

Pulta'wa. See *Poltava.*

Pulteney (pult'ni), WILLIAM, an English politician, was born in 1684, of an old Leicestershire family; died in 1764. He entered the House of Commons in 1705, and became a privy-councilor and secretary of war at the accession of George I, being then a friend and partisan of Walpole. After Walpole became first lord of the treasury in 1721 Pulteney considered himself slighted, and showing his resentment in the House of Commons, was dismissed by his old ally from his lucrative sinecure, the cofferership of the household. Pulteney now became the strenuous and eloquent leader of an opposition to Walpole, and coöperated with Bolingbroke in the production of the antiministerial *Craftsman.* When Walpole was at last driven from office, in 1742, Pulteney was entrusted with the formation of a new ministry, but the composition of it so disappointed the public hopes that he lost his popularity, especially on his acceptance of a peerage, the earldom of Bath. In 1746 he became the head of a ministry which lasted only two days. He was little heard of afterwards in public life.

Pultusk (pöl-tösk'), a town of Russian Poland, on the river Narew, 32 miles N. N. E. of Warsaw. The Saxons were here defeated by Charles XII in 1703, and the Russians had to retreat before the French in 1806. Pop. 15,878.

Pulu (pö'lö), a silky, fibrous substance obtained from ferns of the genus *Cibotium,* and exported from the Sandwich Islands; used for stuffing mattresses, etc. Other species growing in the East Indies, Mexico, etc., yield a similar substance.

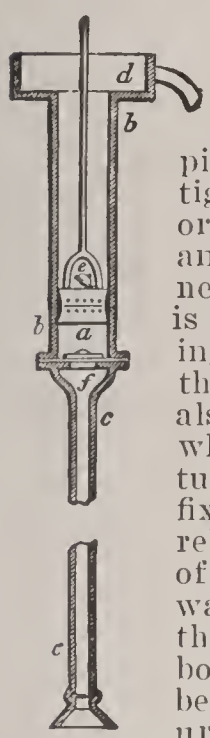
Pulza-oil (pöl'za), the oil yielded by the physic-nut (which see).

Puma (pū'ma). See *Cougar.*

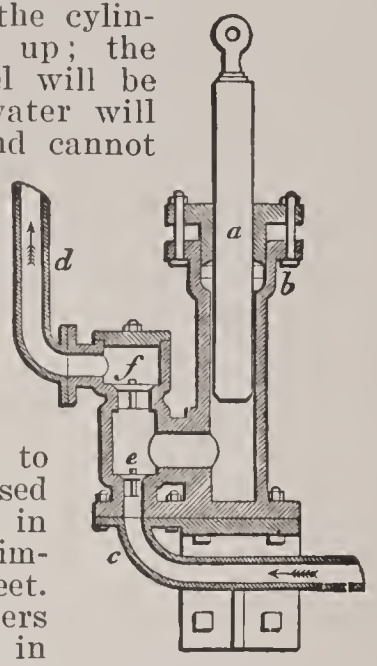
Pumice (pū'mis), a substance frequently ejected from volcanoes, of various colors, gray, white, reddish brown or black; hard, rough and porous; specifically lighter than water, and resembling the slag produced in an iron furnace. Pumice is really a loose,

spongy, froth-like lava. It contains 75 parts silica and 17 alumina, with some iron, lime, soda, etc., and the pores being generally in parallel rows, it seems to have a fibrous structure. Pumice is of three kinds, glassy, common, and porphyritic. It is used for polishing ivory, wood, marble, metals, glass, etc.; also for smoothing the surface of skins and parchment.

Pump, a contrivance for raising liquids or for removing gases from vessels. The air-pump is dealt with in a separate article. Though the forms under which the hydraulic pump is constructed, and the mode in which the power is applied, may be modified in a great variety of ways, there are only four which can be considered as differing from each other in principle. These are the *sucking* or *suction pump*, the *lift-pump*, the *force-pump*, and the *rotary* or *centrifugal pump*. Of these the suction or common household pump is most in use, and for ordinary purposes the most convenient. The usual form and construction of this pump are shown in the annexed engraving. A piston *a* is fitted to work air-tight within a hollow cylinder or barrel *b b;* it is moved up and down by a handle connected with the piston-rod, and is provided with a valve *e*, opening upwards. At the bottom of the barrel is another valve *f*, also opening upwards, and which covers the orifice of a tube *c c*, called the suction-tube, fixed to the bottom of the barrel, and reaching to the bottom of the well from which the water is to be raised. When the piston is drawn up from the bottom of the barrel the air below is rarefied, and the pressure of the external air acting on the surface of the water in the well, causes the water to rise in the suction-tube until the equilibrium is restored. After a few strokes the water will get into the barrel, the air below the piston having escaped through the piston-valve *e*. By continuing, the water will get above the piston and be raised along with it to the cistern *d*, at the top of the barrel, where it is discharged by a spout. The *lift-pump* has also two valves and a piston, both opening upwards; but the valve in the cylinder instead of being placed at the bottom of the cylinder is placed in the body of it, and at the height where the water is intended to be delivered. The bottom of the pump is thrust into the well a considerable way, and the piston being supposed to be at the bottom, as its valve opens upwards there will be no obstruction to the water rising in the cylinder to its height in the well. When the piston is drawn up its valve will shut, and the water in the cylinder will be lifted up; the valve in the barrel will be opened, and the water will pass through it and cannot return, as the valve opens upwards;—another stroke of the piston repeats the same process, and in this way the water is raised from the well: but the height to which it may be raised is not in this as in the suction-pump limited to 32 or 33 feet. The *force-pump* differs from both of these in having its piston solid, or without a valve, and also in having a side pipe with a valve opening outwards, through which the water is forced to any height required, or against any pressure that may oppose it. In such pumps the *plunger* or solid piston is frequently employed instead of the ordinary piston; this arrangement is represented in the accompanying figure, which shows a section of the feed-pump of a steam-engine. The plunger *a* works air-tight through a stuffing-box *b* at the top of the barrel, and on being raised produces a vacuum in the pump-barrel into which the water rushes by the pipe *c*, and is discharged, on the descent of the plunger through the pipe *d*, the valves *e* and *f* serving to intercept the return of the water at each stroke. The side pipe *d*, however, requires the addition of an air-vessel. 'Double-acting' pumps are often employed for household purposes. (See *Steam Engine.*) Centrifugal pumps are universally employed wherever the lift is not too great, and the quantity of water is considerable. A wheel, shaped like an ordinary fan, has passages leading from its center to its circumference; it is made to rotate very rapidly in a casing. Its circumference communicates with a delivery pipe, and its center with a pipe leading to the water which is to be pumped. The rapid revolution of the wheel causes by centrifugal action a constant flow of water from center to circumference of the wheel; and in this

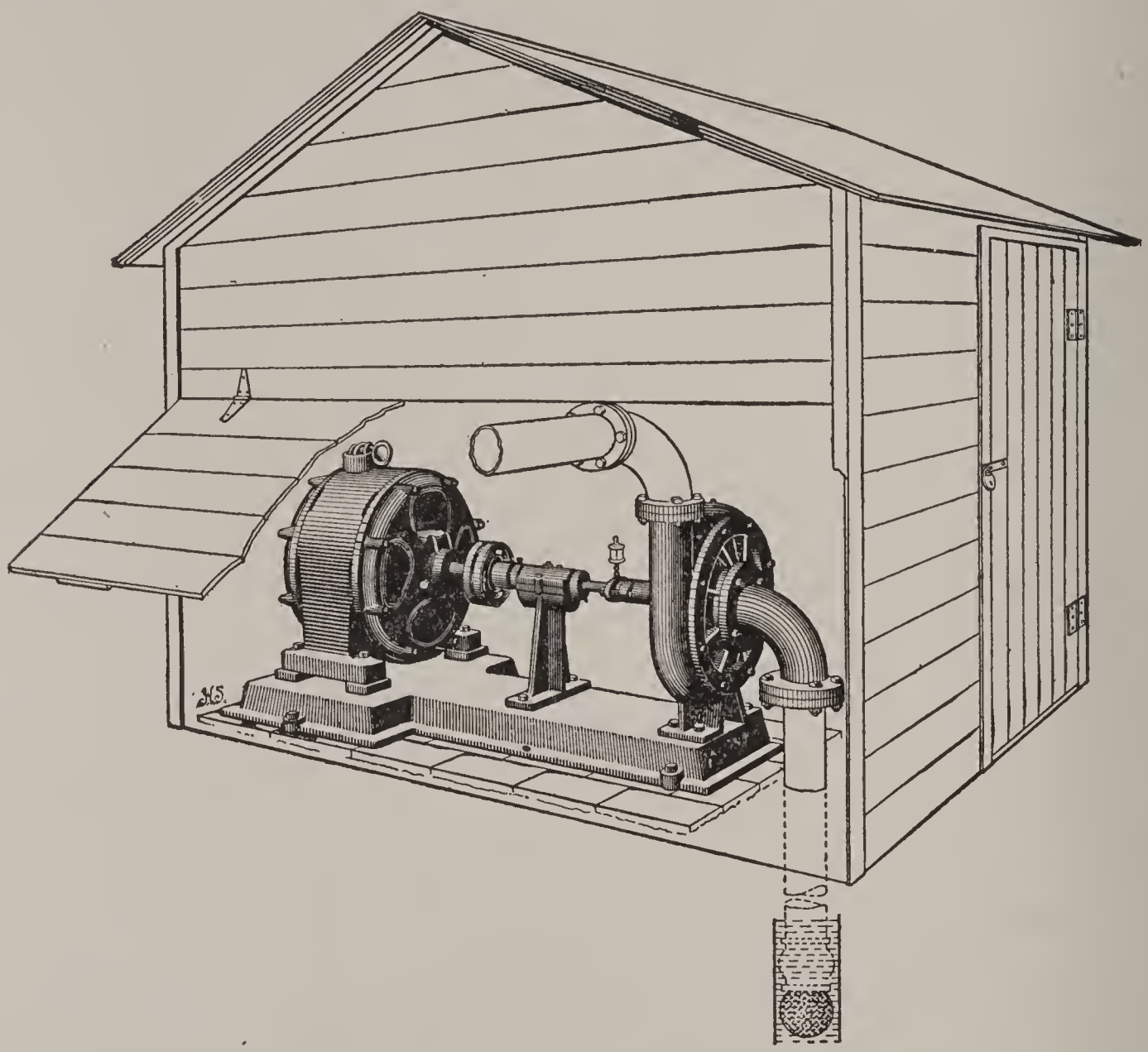


Suction-pump.



Force-pump of Steam-engine.

way the water is sucked up to the center of the wheel, and leaves the circumference by the eduction pipe. See also *Chain-pump*.



Centrifugal Pump and Motor.

Pumpelly (pum′pel-i), RAPHAEL, geologist, born at Oswego, New York, in 1837. In early life he conducted explorations for the governments of China and Japan, and in 1866 became professor of mining engineering in Harvard. He was on the geological survey of Michigan 1870-71, State geologist of Missouri 1871-73, and on the United States geological survey 1879-81 and 1884-91. In 1903-04 he was engaged in explorations in Central Asia. He is the author of *Across America and Asia* and other works.

Pumpernickel (pum′pėr-nik-el), a coarse brown bread made in Westphalia from unbolted rye.

Pumpkin (pump′kin), a climbing plant and its fruit, of the genus *Cucurbĭta*, the *C. Pepo*, nat. order Cucurbitaceæ or Gourds. The pumpkin is originally from India, but is at present cultivated in most parts of Europe, and in America. The fruit is red, and sometimes acquires a diameter of 2 feet. There are two varieties of the plant, one with roundish, the other with oblong fruit. The fruit is eaten in a cooked state.

Pumpkin (*Cucurbita Pepo*).

Pun, a play upon words, the wit of which depends on a resemblance in sound between two words of different and perhaps contrary meanings, or on the use of the same word in different senses.

Punch (contracted from *punchinello*), the chief character in a popular comic exhibition performed by puppets, who strangles his child, beats to death Judy his wife, belabors a police-officer, etc. The puppet-show of Punch seems to have been first popular in England during the reign of Queen Anne. The hero was sometimes called Punchinello, a semi-anglicized form of the Neapolitan Pulcinello. See *Punchinello.*

Punch, a beverage introduced into England from India, where it received its name from the Hindu word *panch*, five, this being the number of its ingredients, arrack, tea, sugar, water, and lime-juice. In a common brew of the beverage its ingredients are rum, brandy, sugar, boiling water, and lemon-juice.

Punch, a tool worked by pressure or percussion, employed for making apertures, in cutting out shapes from sheets or plates of various materials, in impressing dies, etc. Punches are usually made of steel, and are variously shaped at one end for different uses. They are solid for stamping dies, etc., or for perforating holes in metallic plates, and hollow and sharp-edged for cutting out blanks, as for buttons, steel pens, jewelry, and the like.

Puncheon (pun'shun), a liquid measure of capacity containing from 84 to 120 gallons.

Punchinello (pun-shi-nel'ō), a popular Neapolitan exhibition, the origin of the English Punch, said to be derived from a humorous peasant from Sorento, who had received the nickname (about the middle of the seventeenth century) from his bringing chickens (*pulcinellc*) to market in Naples, and who, after his death, was personated in the puppet-shows of the San Carlino theater, for the amusement of the people, to whom he was well known. According to another account, it is a corruption of Puccio d'Aniello, a favorite buffoon of the Neapolitan populace.

Punctuation (pungk'tū-ā-shun), the art of employing signs by which the parts of a writing or discourse are connected or separated as the sense requires, and the elevation, depression, or suspension of the voice indicated. Punctuation serves both to render the meaning intelligible and to aid the oral delivery. Our present system of punctuation came very gradually into use after the invention of printing, the Venetian printers, the Manutii, contributing materially to its development. The principal points used in English composition are the *comma* (,), *scmicolon* (;), *colon* (:), *pcriod* or *full stop* (.), *notc of interrogation* (?), *notc of exclamation* or *admiration* (!), *dash* (—), and *parenthcsis* ( ). The *comma* marks the smallest grammatical division in a sentence, separating the several members of a series, and the subordinate clauses from the main clause. The *scmicolon* indicates a longer pause than the comma, but requires another member or members to complete the sense. The *colon* denotes a still longer pause, and may be inserted when a member of a sentence is complete in itself, but is followed by some additional illustration of the subject. The *pcriod* indicates the end of a sentence, and is also used after contracted words, headings, titles of books, etc., and sometimes after Roman numerals. The *note of interrogation* is placed at the end of a direct interrogatory sentence. The *note of cxclamation* or *admiration* is placed at the end of such words or clauses as indicate surprise or other emotion. The *dash* is employed where a sentence breaks off abruptly, and the subject is changed; where the sense is suspended, and is continued after a short interruption; after a series of clauses leading to an important conclusion; and in certain cases to indicate an ellipsis. The *parenthcsis* encloses a word or phrase introduced into the body of a sentence, with which it has no grammatical connection. In modern usage the *dash* is frequently used to replace the *parenthcsis.*

Pundit. (pun'dit). See *Pandit.*

Punic (pū'nik), the language of the ancient Carthaginians, an offshoot of Phœnician, and allied to Hebrew.—*Punic wars*, wars waged between Rome and Carthage, the first B.C. 264-241; the second B.C. 218-202; and the third, which ended with the destruction of Carthage, B.C. 149-147.

Punica (pū'ni-ka), a genus of plants which consists only of a single species, the pomegranate (*P. granātum*). See *Pomcgranatc.*

Punishment (pun'ish-ment), a penalty inflicted on a person for a crime or offense, by the authority to which the offender is subject; a penalty imposed in the enforcement or application of law. The punishments for criminal offenses now known to American and English law are death by hanging or electrocution, imprisonment with and without hard labor, solitary

confinement, detention in a reformatory school, subjection to police-supervision, and putting under recognizance. The methods of punishment differ in different states, but the general character of punishment for offenses, as now in use, does not greatly vary in civilized countries generally. In England, in cases of felony and of certain specific misdemeanors, when a previous conviction for a similar offense is proved, the sentence may include police supervision for seven years or less, to commence at the expiration of the offender's term of imprisonment. On its expiry he must notify to the police within forty-eight hours his place or any subsequent change of residence, and report himself once a month, a breach of any of these regulations rendering him liable to imprisonment for twelve months with or without hard labor. When the offender is ordered to find recognizances, personal or other, he may, in default, be imprisoned. In army punishment a commissioned officer must be tried by court-martial, which may sentence him to death, or cashier him, or place him at the very bottom of the officers of his grade. Privates may for minor offenses be ordered short imprisonments, or punishment-drill, or stoppage of leave or pay. For grave offenses they are tried by court-martial, and may be sentenced to dismissal from the service, or to imprisonment, to penal servitude, or to death. In the navy, for officers the chief additions to the punishments inflicted in the army are forfeiture of seniority for a specified time or otherwise, dismissal from the ship to which the offender belongs, and reprimand more or less severe. For men the punishments in the case of grave offenses are of the same character as in the army, flogging being practically abolished. For less serious offenses there is a system of summary punishments, including short terms of imprisonment which can be awarded by captains of ships. Within recent years the severity of punishment by imprisonment has been mitigated to some extent in the United States. Ten of the States have adopted the principle of indeterminate sentences, the time depending on the conduct of the convict. The severity of prison discipline has been reduced and recreation provided for the prisoners in some instances, and in others the convicts have been allowed to do outdoor work without guards, their word of honor being taken, and in very few instances broken.

Punjab (pun-jäb'), or PANJAB (the name means '*Five Rivers*'), a province of British India, under the administration of a lieutenant-governor, so-called because it was the region intersected by the five tributaries of the Indus, the Sutlej, the Beas, the Ravi, the Chenab, and the Jhelum. The present lieutenant-governorship of the Punjab, however, is larger than the Punjab proper, and is bounded on the west by Afghanistan and Beluchistan; on the north by Kashmir; on the east by the Northwest Provinces; and on the south by Sind and Rajputana. The area, exclusive of native states, is 97,209 square miles; the pop., according to the census of 1901, 24,754,737; inclusive of native states, the area is 133,741 square miles, and the pop. 29,179,135. It consists of thirty-two British districts and forty native tributary states. For administrative purposes it is divided into the divisions of Delhi, Hissar, Ambala, Jalandhar, Amritsar, Lahore, Rawal Pindi, Multan, Derajat, and Peshawar. Lahore, situated near the center of the province, is the capital of the Punjab, but its principal city is Delhi, the ancient metropolis of the Mogul sovereigns of India. The extreme northern portion of the Punjab is rendered mountainous by spurs, or offsets, of the great Himalaya system; but for the most part the province consists of a series of extensive plains. These are divided into eastern and western, which may be roughly defined as lying east and west of the meridian of Lahore. The eastern plains include the most fertile and populous portion of the Punjab, with the three great cities of Delhi, Amritsar, and Lahore. Their population is largely urban; trade and manufactures flourish, and the cultivable area is generally under the plow, with the exception of the southwestern portions, where flocks and herds pasture in extensive jungles. The western plains, on the contrary, and with the exception of a comparatively narrow zone which is fertilized by irrigation, and which produces some of the finest wheat in the world, are covered by stunted bush, with short grass in dry seasons, and by saline plants which afford nourishment to great herds of camels. These, with cattle, sheep, and goats, are tended by a nomad population. The difference between the inhabitants of these two series of plains is also very marked, those in the eastern partaking of the character of the Hindu inhabitants of India, while those in the western resemble more the Mussulman peoples of the Transsuleiman country. Though numerically small, the Sikh element in the population is very important. The Sikhs constituted the dominant class when the Punjab became British, and they still compose the mass of the gentry

between the five rivers. Since the mutiny the Punjab has made great progress in commerce and general industry, partly through the construction, under British rule, of irrigation canals and railways. One of the most important products of the Punjab is rock-salt. In addition to the manufactures common to the rest of India the industries of the Punjab include such special products as the silks of Multan and the shawls and carpets of Lahore. The province enjoys an extensive trade with adjacent countries, and sends its products to Delhi by railways, and by the Indus and the Indus Valley Railway to Sind and the sea. Its imports from Britain are chiefly piece-goods, cutlery, and other metal works. The Punjab has had a rather eventful history from the time of Alexander the Great downward. After being long held by rulers of Afghan or Tartar origin, the Sikhs under Runjit Singh established themselves here early in the last century. At a later date the country fell into a very distracted state; its Sikh rulers came into warlike contact with the British, and after the second Sikh war, in 1849, the country was brought under British administration.

Punjnud (punj'nud), the name given to the stream which pours into the Indus, about 70 miles above the Sind frontier, the combined waters of the five rivers, the Sutlej, the Beas, the Ravi, the Chenab, and the Jhelum.

Punkah (pung'ka), in its original sense a portable fan made from the leaf of the palmyra, but in Anglo-Indian parlance a large fixed and swinging fan formed of cloth attached to a rectangular frame suspended from the ceiling and pulled backwards and forwards by means of a cord, thus causing a current of air in the apartment.

Punnah (pun'na), a native state of India, in Bundelcund, by the British agency of which it is politically superintended, formerly very prosperous from the yield of its diamond mines. Estimated area, 2568 sq. miles; pop. about 200,000.— PUNNAH is the chief town. Pop. 14,676.

Puno (pö'nō), a town of Peru, capital of the department of the same name, on the west shore of Lake Titicaca, about 12,430 feet above sea-level. Pop. about 6000.— The department is distinguished by the extent and richness of its pastures, and was formerly famous for its silver mines. Its principal exports are the wool of the sheep, llama, alpaca, and vicuña. Area about 42 sq. miles; pop. 537,345.

Punt, an oblong, flat-bottomed boat used for fishing and shooting in shallow waters. The most common mode of propulsion is by pushing with a pole against the bottom of the river, etc., a process which is hence called punting.

Punta Arenas (pön'ta a-rā'nas), a convict station and capital of the Chilean colonial territory of Magellan, which most of the steamers passing through Magellan Strait call at, there being coal in its vicinity. Pop. 8397.

Puntas Arenas, the principal port of Costa Rica, Central America, on the Gulf of Nicoya. Pop. (1904) 3569.

Pupa, same as *Chrysalis* (which see).

Pupil. See *Eye.*

Pupilage (pū'pi-lāj), the period during which one is a minor.

Pupin (pū'pin), MICHAEL IDVORSKY, scientist, born at Idvor, Hungary, in 1858, was graduated from Columbia University, New York, in 1883, and became adjunct professor of mechanics there in 1889. In 1901 he announced the discovery of a method of practicable ocean telephony. He wrote *Propagation of Long Electrical Waves*, and other papers.

Puppets and Puppet-shows (pup'etz), the performances of images of the human figure moved by fingers, cords, or wires, with or without dialogue. Puppets in English, French *marionettes*, Italian *fantoccini*, are of great antiquity. In early times in England puppet-shows were called *motions*, and generally represented some scriptural subject. In later times they have ranged from Punch and Judy to representations of shipwrecks and battles.

Pura'nas. See *Sanskrit.*

Purbeck (pur'bek), ISLE OF, south of Dorsetshire, England, a peninsula so separated from the mainland on the north by Poole harbor and the Frome as to be connected with it by only a very narrow isthmus. It is about 12 miles long by 7 miles broad. The prevailing rock is limestone.

Purbeck Beds, the uppermost members of the Oölite proper, or according to other writers the basis of the Wealden formation, deriving their name from the peninsula of Purbeck, where they are typically displayed. They consist of argillaceous and calcareous shales, and fresh-water limestones and marbles, and are altogether 300 feet thick. They are noted for their layers of fossil vegetable earth (dirt-

beds), enclosing roots, trunks, and branches of cycads and conifers.

Purbeck Marble, PURBECK STONE, an impure fresh-water limestone obtained from the Purbeck beds. It takes on a good polish, but is deficient in durability under exposure to the air, and has hence lost much of its favor as a building-stone. It is much used for slender shafts in the interior of Gothic buildings, for which purpose it answers well.

Purcell (pur'sel), HENRY, an English musical composer, born in 1658, was the son of a musician of the chapel-royal. When quite young he was admitted a chorister of the chapel-royal, where he studied music under Dr. Blow among other teachers, and in 1679 he became organist of Westminster Abbey, and in 1682 of the chapel-royal, holding both appointments conjointly. In 1680, probably, he composed for a private seminary *Dido and Eneas*, which has been called the first genuine English opera, but has never been produced on the public stage. For some years after he became organist of Westminster Abbey he composed mainly anthems and sacred music, all of great excellence. In 1690 he wrote the music for Dryden's version of *The Tempest*. In 1691 he produced the music to Dryden's *King Arthur*, which, though considered his dramatic masterpiece, was not published until 1843. In 1694 he wrote, for St. Cecilia's Day, his great works *The Jubilate* and *Te Deum*, and in 1695 the music to *Bonduca*, in which was 'Britons, Strike Home.' He died in 1695, and was buried in Westminster Abbey. Purcell was equally great in church music, chamber music, and music for the theater.

Purchas (pur'chas), SAMUEL, was born in 1577, at Thaxted, in Essex, and educated at Cambridge. He took orders and became in 1604 rector of Eastwood in Essex, the duties of which office he left for some years to be discharged by a brother, while he devoted himself in London to the self-imposed task of collecting geographical, historical, and miscellaneous information. In 1613 he issued *Purchas his Pilgrimage, or Relations of the World and the Religions observed in all Ages and Places discovered from the Creation unto the Present*, etc. In 1615 he was appointed rector of St. Martin's, Ludgate Hill, London, a position favorable to the pursuit of his multifarious researches. The MS. remains of Hakluyt having come into his hands he gave to his next work, published in 1624, the title *Hakluytus Posthumus, or Purchas his Pilgrims, containing a History of the World in Sea Voyages and Land Travels by Englishmen and others*, which is valuable as containing the narratives of voyagers, explorers, and adventurers as written by themselves, the language of the previous work, the *Pilgrimage*, on the other hand being Purchas's own. The *Pilgrims* have been much utilized by subsequent compilers of voyages and travels. Purchas died in London in 1626.

Purchase (pur'chas), in law, is the act of obtaining or acquiring the title to lands and tenements by money, deed, gift, or any means except by descent. *To be worth so many years' purchase* is said of property that would bring in, in the specified time, an amount equal to the sum paid. Thus to buy an estate at *twenty years' purchase* is to buy it for a sum equivalent to the total return from it for twenty years.

Purchase, a system formerly common in Great Britain, now abolished, by which more than half the first appointments and much of the subsequent promotion of officers in the British army used to be effected. The prices of commissions were fixed as follows: — £450 for a cornetcy or ensigncy; £700 for a lieutenancy; £1800 for a captaincy; £3200 for a majority; and £4500 for a lieutenant-colonelcy, which was the highest rank that could be obtained by purchase. In theory an officer wishing to retire from the service might sell his commission for the price affixed to the rank he occupied. When a superior officer 'sold out' the next officer inferior to him might purchase promotion to the rank of the former by merely paying the difference between the prices of their respective commissions. The rank of the second might be reached in the same manner by his next inferior, and so on down to the ensign or cornet. No commission could be purchased by one officer unless another officer vacated his commission by its sale. The abolition of the purchase system took place in 1871, but the officers who were deprived of a salable interest in their commissions were compensated by giving them a sum of money, the payment of which was to be extended over twenty-five years, and which, it was estimated, would amount to £8,000,000. Promotion has since been through seniority, tempered by selection. The Regimental Exchange Act of 1875 permitted the exchange of commissions through purchase under such conditions as the crown might deem expedient for the time being. No such system was ever introduced into the United States

army, in which promotion has always depended solely upon merit, real or claimed.

Purgative (pur'ga-tiv), a medicine used for the purpose of producing the evacuation of the bowels. The following is a common classification: – (1.) *Laxatives* or *Mild Cathartics*, employed when the least possible irritation is desired, such as manna, sulphur, cassia, castor-oil, tamarinds, prunes, honey, ripe fruit. (2.) *Saline* or *Cooling Laxatives*, giving rise to more watery evacuations than the first group, such as Epsom salts, Glauber's salt, phosphate of soda, Seidlitz powders, etc. (3.) *Active Cathartics*, occasionally *acrid*, frequently *tonic* and *stomachic*, such as rhubarb, senna (often in the form of black draught), and aloes. (4.) *Drastic* or *Violent Cathartics*, such as jalap, scammony, gamboge, croton-oil, colocynth, and elaterium, which in large doses act as irritant poisons, and are employed in smaller doses chiefly when the bowels have failed to be moved by milder purgatives. (5.) *Mercurial Purgatives*, such as calomel, blue pill, and gray powder. Of late years podophyllin, a preparation of the resin of the May-apple, has come much into vogue as a substitute for mercury in its various forms. All the members of this group are usually combined with or followed by other purgatives, blue pill, for instance, being followed by black draught, and podophyllin combined with taraxacum.

Purgatory (pur'ga-to-ri), as believed in by the Roman Catholic Church, is an intermediate state after death in which the souls of the righteous expiate, through temporary suffering, sins committed in this life, and not fully atoned for before death. According to the Council of Trent, they are 'assisted by the suffrages of the faithful, but especially by the most acceptable sacrifice of the mass,' to be enabled to enjoy the happiness of heaven. Catholics claim that this belief in purgatory is upheld by the general teaching of Scripture without being specifically declared in any particular passage; they also claim that it is in harmony with the faith and practice of the early Christian ages.

Puri. See *Pooree* and *Jagannâtha*.

Purification (pūr-i-fi-kā'shun), the Jewish rite of, was mainly one through the performance of which an Israelite was readmitted to the privileges of religious communion, lost through uncleanness. The chief varieties of such uncleanness, and the methods of purification from it required, are detailed in Lev., xii, xiv, xv, and Numb., xix. The necessity of purification was extended after the captivity to a variety of cases not included in the Mosaic legislation, such as the washing of cups and pots, etc., referred to in Mark, vii, 4.

Purification of the Virgin Mary, FEAST OF THE, called also the feast of the Presentation of the Child Jesus, is a festival of the Christian church held on the 2d of February, in commemoration of the event related in Luke's gospel, chap. ii. The festival dates from very early times, and is said to have been formally instituted by Pope Gelasius in A.D. 494. See *Candlemas*.

Purim (pū'rim), a Jewish festival observed on the 14th and 15th of Adar (March), instituted to commemorate the preservation of the Jews in Persia from the destruction threatened them by the schemes of Haman (Esther, ix).

Puritans (pū'ri-tanz), a name first applied to those English Protestants who regarded the Reformation in England as incomplete, and the Anglican Church, even of Edward VI, as retaining too much of the discipline, ritual, and ceremonial of the Church of Rome. Many of them, who were driven into exile under Queen Mary, and who returned to England after the accession of Elizabeth, brought back a zealous desire to remodel the Church of England in the spirit of continental Protestantism, especially that of Geneva. In 1572 a presbytery was set up at Wandsworth in Surrey, and before many years Presbyterianism found adherents both among the clergy and the laity. Meanwhile the Brownists, the Independents of later days, whose Congregationalism was as much opposed to Presbyterianism as to Episcopacy, began to be organized and to make some progress. In doctrine these two Puritan parties differed little from each other, or from many Anglicans who remained contented with the Church of England as it was. During the later years of Elizabeth the nickname of Puritan was popularly bestowed on all in the church, or out of it, whose views of religion led them to adopt a great austerity of life and gravity of demeanor; who made constant use of Biblical phraseology in their ordinary conversation, and who treated as sinful the most of the amusements and diversions of the society around them. The drama was specially obnoxious to them, and the dramatists repaid the hatred of the extreme Puritan by ridiculing and caricaturing him on

the stage. Though the Puritans were always steadfastly loyal to Elizabeth, the legislation which she favored visited with severe penalties all Protestant nonconformity to the Established Church, and in 1592 several leading Brownists were brought to the scaffold. The hopes with which the accession of James I inspired the Puritan party in the church were grievously disappointed when their moderate demands for a reform of ritual and a slight modification of episcopal authority were rejected at the Hampton Court Conference. During his reign the prelates and many of the clergy became less Protestant, while the Puritan element in the church, and out of it, increased in intensity. Nonconformity was pursued by new penal statutes, and numbers of Puritans emigrated to New England. This emigration continued during the reign of Charles I and the ascendency of Laud. The Parliamentarians who took arms against Charles I were mainly Puritans, and the bulk of them were Presbyterians. Presbyterianism in England reached its height with the meeting of the General Assembly of Divines at Westminster. (See *Presbyterians.*) With the downfall of the Anglican system Independency again reared its head in England. The Independents now combined with their congregationalism the desire for a theological latitude, which widened the gulf between them and the Presbyterians. The army became leavened with Independency, and Oliver Cromwell its champion. With his ascendency the influence of Presbyterianism as a power in the state dwindled, and Independency became the dominant element in English Puritanism. After the restoration of Charles II and of the old Anglicanism, the Presbyterians, Independents, and Baptists were the three chief denominations into which Puritanism had split up. Since then Nonconformists or Dissenters has been the term generally used where Puritanism would formerly have been employed. The settlement of New England by Puritans brought that section of the American colonies under the dominance of Puritanism to the extent of persecution and expulsion of other sects. The Puritans long reigned supreme in New England, and especially in Massachusetts, where they displayed an intolerance equal to that of the Anglican church from the dominance of which they had escaped.

Purl, is the name now given to hot beer flavored with gin, sugar, and ginger.

Purniah (pur'nē-a), the northeastern district of the Bhágalpur division of the lieutenant-governorship of Bengal. Rice and indigo are its chief products. Area, 4956 square miles; pop. 1,874,794.— PURNIAH, the chief town, stands on the east bank of the Saurá River. It is an unhealthy place, but does a considerable trade in jute. Pop. 14,007.

Purple (pur'pl), a secondary color compounded by the union of the primaries *blue* and *red.* Of all the various kinds in use, the Tyrian dye was anciently the most celebrated. This color was produced from an animal juice found in a shellfish called *murex* by the ancients; and as it was thus obtained only in small quantities, its use was restricted to the great and wealthy. It became the distinctive color of imperialism, and the later emperors of the East forbade its use by subjects. Hence their offspring were called *porphyrogeniti,* born in the purple. In modern times, and from the red or scarlet hat, cassock, and stockings worn by them, cardinals are sometimes said to have obtained the purple. With the general disuse of the purple obtained from shellfish, archil and cudbear, yielded by various species of lichens, were employed in the dyeing of silk and wool; but they have been superseded by the purples obtained from aniline. For cotton the chief purple dye was furnished by madder, but the alizarin to which madder owed its dyeing properties is now prepared from coal-tar. The common shades of purple with which wool is dyed are obtained from logwood with a mordant of alum and tartar.

Purple-black, a preparation of madder used as a pigment.

Purple Emperor, the *Apatura* or *Nymphalis Iris,* a large, somewhat rare, and richly-colored British butterfly; so called from the splendid purple, iridescent color of its fore-wings.

Purple Grackle. See *Crow-blackbird.*

Purple of Cassius. See *Cassius, Purple of.*

Purples, EAR COCKLE, or PEPPERCORN, a disease affecting the ears of wheat, produced by the *Tylenchus* or *Vibrio tritici* ('wheat eel'), one of the Infusoria. The infected grains of wheat at first assume a dark-green color, which soon deepens to a black, and become rounded like small peppercorns. The husks open, and the diseased grains are found to contain no flour, but a moist substance of white color and of cottony consistence. A single grain of wheat may contain 50,000 young vibrios. These forms may be dried, and

restored again on the application of moisture. Dilute sulphuric acid, in the proportion of 1 of acid to 100 parts of water, destroys the vibrio effectually.

Purples, THE, or PURPURA, spots of a livid red on the body, the result of extravasation of blood from the skin. In ordinary purpura, which is not dangerous, tonics, especially quinine and iron, are the most effective remedies. In the *purpura hæmorrhagica*, or bleeding purpura, there is hemorrhage from mucous membranes, sometimes terminating fatally. In this form of the disease with copious bleeding, benefit may be derived from the use of ergot, given either by the mouth or hypodermically, as a solution of ergotine.

Purple-wood, the heart-wood of *Copaifĕra pubiflōra* and *C. bractcāta*, imported from the Brazils, well adapted for mortar-beds and gun-carriages, and also used for ramrods, buhl-work, marquetry and turnery.

Purpura (pur'pū-ra), a genus of gasteropod molluscs, of which the greater number are littoral. Many of these molluscs secrete a fluid which is of a purplish color, but one in particular furnished that celebrated and costly dye of antiquity called the Tyrian purple.

Pur'pura. See *Purples*.

Purqueira Oil, same as *Pulza Oil*.

Purse-crab, a name for decapod crustaceans of the genus *Birgus*, allied to the hermit-crabs. A species, *B. latro* (the robber-crab), found in the Mauritius and the more eastern islands of the Indian Ocean, is one of the largest crustaceans, being sometimes 2 to 3 feet in length. It resides on land, while paying a nightly visit to the sea, often burrowing under the roots of trees, lining its hole with the fibers of the cocoanut husk and living on the nuts, which (according to some writers) it climbs the trees to procure, and the shells of which it certainly breaks with great ingenuity.

Purser (pur'sėr), in the navy, the officer who kept the accounts of the ship to which he belonged, and had charge of the provisions, clothing, pay, etc. He is now designated *paymaster*.

Purslane (purs'lān), a plant of the genus *Portulăca* (*P. oleracea*), with fleshy, succulent leaves, naturalized throughout the warmer parts of the world. Purslane was formerly more used than at present in salads as a pot-herb, in pickles, and for garnishing. It has antiscorbutic properties.

Pursuivant (pur'swi-vant), an attendant on the heralds, one of the third and lowest order of heraldic officers. There are four pursuivants belonging to the English College of Arms, *Rouge Croix*, *Blue Mantle*, *Rouge Dragon* and *Portcullis*. In the court of the Lyon King-of-Arms in Scotland there were formerly six pursuivants, *Unicorn*, *Carrick*, *Bute*, *Kintyre*, *Ormond* and *Dingwall*, but the last three have been abolished.

Puru (pö'rö), or PURUS, a river of South America, which rising in the east of Peru enters Brazil, and flowing northeast after a course of 400 miles joins the Amazon about 100 miles above the confluence of the Madeira with the latter.

Purveyance (pur-vā'ans), formerly in England the exercise by officials called *purveyors* of the royal prerogatives, involving a right of preëmption, by which the king was authorized to buy provisions and necessaries for the use of his household at an appraised value, in preference to all his subjects, and even without the consent of the owner; it included the right of impressing horses and carriages, etc., for the use of the sovereign. It was also practiced by many of the great English nobles. It led to much oppression and many exactions, and a number of statutes were passed to prevent them. There was until recently a class of purveyors in the British army, who superintended the army hospitals. Their duty is now exercised by the army service corps.

Purwa (pör'wä), a town of India, Unao district, Oude province, with manufactures of shoes and leather-work. Pop. about 11,000.

Pus, the white or yellowish matter found in abscesses, and formed upon the surfaces of what are sometimes misnamed healthy sores. It consists of dead and dying white blood corpuscles infected with pyogenic germs and tissue cells and with dissolved tissue and blood serum.

Pusey (pū'si), EDWARD BOUVERIE, after whom the Tractarian movement in the Church of England became designated Puseyism, was born in 1800. He was educated at Eton and Christ Church, Oxford, of which he became a fellow in 1824. In 1828 he was appointed to the regius professorship of Hebrew at Oxford, to which was attached a canonry of Christ Church. In 1833 the *Tracts for the Times* began to appear, but he was not prominently

connected with the Tractarian movement until 1835-36, when he contributed to the *Tracts* one on baptism which excited much attention. He published a defense of the famous *Tract No. 90*, and in 1843 he was suspended by the vice-chancellor of Oxford from preaching for three years, on account of the very high sacramental doctrine inculcated in his sermon on the Eucharist, preached before the university. The prominence thus given to him, his position in the university, his reputation for scholarship, and his thoroughgoing advocacy of 'Anglo-Catholic' principles, procured the general adoption of the term Puseyism as a

Rev. Dr. Pusey.

synonym of Tractarianism; and with the secession of Newman to Rome, Pusey became the acknowledged head of the new church party. During the rest of his life he lived very retired, though a continual flow of books, pamphlets, etc., came from his pen. He died in 1882. Among the more substantial of his works, in addition to his *Library of English Fathers* and *Anglo-Catholic Library*, are his *Councils of the Church*, from the Council of Jerusalem, A.D. 51, to the Council of Constantinople, A.D. 381 (1857); *Daniel the Prophet*, nine lectures (1864); and the *Minor Prophets*, with a commentary and introduction to the several books (1860-77).

Puseyism. See *Tractarianism*.

Pushkar (push'kar), a town of India, in Ajmere-Merwára, Rajputána, the only one in India containing a temple dedicated to Brahma. A great fair in October and November is attended by about 100,000 pilgrims. Pop. 3750.

Pushkin (push'kin), ALEXANDER, Count of Sergejevitch, a Russian poet, born at St. Petersburg in 1799; died in 1837. At an early age he was, on account of his liberal opinions, sent to Odessa, where he discharged various offices, but was restored to favor on the accession of Nicholas in 1825, who appointed him imperial historiographer. He made a study of foreign literatures, and was much influenced by Byron. His first poem was *Ruslan and Liudmila* (1821); this was followed by the *Prisoner of the Caucasus;* the *Fountain of Bakhtchisarai; Eugene Onegin;* the *Gypsies;* and *Poltava*. He was also the author of a dramatic poem, *Boris Godoonof*. He fell in a duel with his brother-in-law. His works have been translated into German, French and English.

Pushtu (push'tö; of which PUKHTU is a dialectic variation) is the vernacular language of the Afghans proper wherever they may be settled, and by the best authorities is regarded as an Aryan language, more or less allied to the Iranian group. Persian is the language of the educated classes in Afghanistan, and is also known to the people, who, however, prefer the use of Pushtu.

Pustule (pus'tūl), a small and nearly rounded elevation of the cuticle, with an inflamed base, and containing pus. Diseases known as 'pustular diseases' are those that are characterized by true pustules. Smallpox and chicken-pox are accompanied by pustules, but these are regarded as febrile, not pustular diseases, the eruption being not primary but secondary.

Putchock, PUCHUCK (puch'uk), the root of *Aplotaxis Lappa*, a composite plant growing on the Himalayas in the vicinity of Cashmere. It is exported to the Malay countries and to China, where it forms a main ingredient in the Chinese pastille-rods known as *joss-sticks*. In Upper India it is given as a medicine in various complaints ranging from coughs to cholera.

Puteaux (pû-tō), a town of France, in the department of the Seine, on the left bank of the Seine. Pop. (1906) 28,718.

Putnam (put'nam), ISRAEL, soldier, was born in Salem, Massachusetts, in 1718, and took an active part as an officer in the French and Indian war, in which he displayed the greatest hardihood and courage. At the outbreak of the Revolution he left his farm and hastened to Boston, where he became active in the siege, commanding at the battle of Bunker Hill. He

was energetic throughout the war and was appointed by Congress one of the four major-generals under Washington. He died in 1790.

Putnam, a city, capital of Windham Co., Connecticut, is on the Quinnebaug River, 33 miles N. N. E. of Norwich. It has extensive manufactures of cotton, woolen and silk goods, and also produces shoes, cutlery, trunks, boxes, etc. Pop. 7280.

Putney (put'ni), a suburb of London, in Surrey, on the right bank of the Thames. It is the birthplace of Gibbon, the historian, and here the Oxford-Cambridge boat races are rowed. Pop. (1911) 28,246.

Putrefaction (pū-tri-fak'shun), such a decomposition of dead organic matter as is generally accompanied by the evolution of fetid gases, now regarded as due to the agency of bacteria or other organisms floating in the atmosphere, which find a nidus in the putrescible matter and grow and multiply in it. The substances in which these micro-organisms are thus developed are reduced either to much more simple compounds or to their original separate elements. The putrefaction, or putrefactive fermentation, of animal substances is usually attended by more fetid and noxious exhalations than those arising from vegetable products, chiefly through the more abundant presence of nitrogen in the former. The formation of ammonia, or of ammoniacal compounds, is a characteristic of most cases of animal putrefaction, while other combinations of hydrogen are also formed, especially carburetted hydrogen, together with complicated and often highly poisonous vapors or gases, in which sulphur and phosphorus are frequently present. These putrefactive effluvia are, for the most part, easily decomposed or rendered innocuous by the agency of chlorine. The rapidity of putrefaction and the nature of its products are to a great extent influenced by temperature, moisture, and access to air. A temperature between 60° and 80°, a due degree of humidity, and free access of air are the circumstances under which it proceeds most rapidly. Hence the action of the minute organisms which produce putrefaction can be checked or altogether prevented by a very high, or a very low, temperature, by the exclusion of air, and by the absence of moisture. Antiseptics prevent and to some extent arrest the progress of putrefaction by killing the germs. Boiling destroys most of them. True disinfectants prevent putrefaction, destroy the germs, and dissipate the noxious products.

Puttea'la. See *Patiala.*

Puttenham (put'ten-am), GEORGE, an English writer, regarded as the author of *The Art of Poesie,* which appeared anonymously in 1589. If its author, he was, from indications given in that and another work from the same pen, born about 1530, and became a scholar of Oxford. In 1579 he presented his *Partheniades* to Queen Elizabeth, to whom he was a gentleman-usher. The *Art* is a review of ancient as well as modern poetry, and was written for the court and to instruct in versification. Its author wrote several other pieces which have been lost.

Putty (put'i), a kind of paste or cement compounded of whiting or soft carbonate of lime and linseed-oil, beaten or kneaded to the consistence of dough. In this state it is used by glaziers for fixing in the squares of glass in window frames, etc., and also by house-painters to stop up holes and cavities in woodwork before painting.

Putty-powder, a pulverized oxide of tin sometimes mixed with oxide of lead. It is extensively used for polishing and other purposes in glass and marble works; the best kinds are used for polishing plate.

Puy (pů-ē), LE, called also LE PUY-EN-VELAY, and LE PUY-NÔTRE-DAME, a town of France, chief town of the department of Haute-Loire, 270 miles S. S. E. of Paris. It is built on the steep slope of an isolated craggy hill, and viewed from a distance has a most striking and picturesque appearance. Overtopping the houses is a conical rock crowned by a small chapel and a colossal statue of the Virgin. The cathedral, an ungainly Romanesque building, dates from the sixth to the twelfth century. The manufactures are chiefly lace, tulle, and woolens. Pop. 20,507.

Puy-de-Dôme (pů-ē-dė-dōm), a department of Central France; area, 3070 square miles; takes its name from a volcanic cone (4805 feet) which overlooks it. The highest point in the department, Puy-de-Sancy, 6188 feet, is the most elevated peak of Central France. The department, with its numerous extinct volcanoes and volcanic formations, is geologically very interesting, the volcanic formations giving the scenery a very distinctive character. Of a total area of 3073 sq. miles, much the largest proportion is good arable and pasture land, the fertile plains of Limagne, more than 70 miles in length, consisting of alluvial deposits of volcanic

origin, making it one of the richest regions of France. There are coal and other mines in the department, which also contains a number of springs, some of which have been resorted to by health-seekers since the days of the Romans. The industries of the department include papermaking, sugar production, and the manufacture of various textile fabrics. Pop. (1906) 535,419.

Pu-Yi (HSUANTUNG), Emperor of China. He was born February 11, 1906, and acceded in 1908, in his third year, on the death of the emperor Kwang Hsu. His father, Prince Chun, acts as regent.

Puzzola'na. See *Pozzolana* and *Cements.*

Pwllheli (pül-hā'lē), a parliamentary and municipal borough and seaport of Wales, in Carnarvonshire, on Cardigan Bay, 21 miles S. W. of Carnarvon. It is an old town, is surrounded by splendid scenery, is much visited by tourists, and has become a favorite watering place. It belongs to the Carnarvon district of parliamentary boroughs. Pop. (1911) 3791.

Pyæmia (pī-ē'mi-a), a form of blood-poisoning, a dangerous disease resulting from the introduction of decaying tissue, forming pus (which see), into the blood circulation. Such matter may be introduced through an ulcer, wound, an imperfectly closed vein, or a mucous membrane, as that of the nose. This disease was common after severe operations in crowded hospitals, whose atmosphere was loaded with purulent or contaminated matter. It has been much checked of late years by the improved ventilation of hospitals, and by the application of antiseptics in the performance of surgical operations and the dressing of wounds.

Pycnogonum (pik-nog'o-num), a genus of Arachnida, the sea-spiders. Some species are parasitic upon fishes and other marine animals, but the common species, *P. littorāle*, is free when adult, and does not appear to be parasitic during any period of its existence. *P. Balænārum* attaches itself parasitically to the whale.

Pye (pī), HENRY JAMES, a poet laureate of England, was born in 1745, of an old Berkshire family. In 1784 he entered parliament as member for Bucks. Having in 1775 published a translation of six odes of Pindar, in 1778 one of Frederick the Great's *Art of War*, and in 1786 another of the *Poetics* of Aristotle, with a commentary, he was, in 1790, appointed poet laureate. In 1792 he was appointed a Westminster police magistrate. In 1801 appeared his *Alfred*, an epic. He died in 1813.

Pye, JOHN, an English engraver, born in 1782; died in 1874. Early in the century he gained a high reputation for his engravings of Turner's landscapes, a number of which he executed, beginning with *Pope's Villa* in 1811. He also engraved works by Claude, Michael Angelo, Gasper Poussin, Landseer, etc. He passed much of his life in Paris, and was elected a corresponding member of the French Institute.

Pygmalion (pīg'mā-li-on), in Greek mythology, a king of Cyprus, who, having made an ivory image of a maiden fell in love with his own work, and entreated Venus to endow it with life. His prayer was granted, and the maiden became his wife.

Pygmy (pig'mi), one of a race of dwarfs, first mentioned by Homer as dwelling on the shores of Ocean, and having to sustain a war against the cranes every spring. Later writers place them mainly in Africa, and Aristotle at the sources of the Nile. Recent travelers have found tribes of dwarfs in many parts of Africa, in the Andaman and Philippine Islands (See *Negritos*), and also related tribes elsewhere in that region. A tribe of Pygmies has recently been discovered in New Guinea, averaging 4 feet, 3 inches in height and extremely wild. In addition a dwarf race has been reported in New Britain, who dwell in rock clefts and steal fruit. There are also very short people in the Bismarck Archipelago, the Solomon Islands, and the Malay peninsula, but these indicate a race mixture. The Bushmen of South Africa are a small people, but not dwarfish. See *Akkas.*

Pylades (pī'la-dēz), in Greek mythology, son of Strophius, king of Phocis, and Anaxibia, the sister of Agamemnon, after whose murder by Clytemnestra, their son Orestes, being carried secretly to the court of Strophius, formed the friendship with Pylades which has become proverbial. He assisted Orestes in murdering Clytemnestra, and eventually married his sister Electra.

Pyle (pīl), HOWARD, American artist and writer, born at Wilmington, Delaware, in 1853; died in 1911. His brilliant work as an illustrator made him one of the foremost of American artists.

Pylon (pī'lon), in Egyptian architecture, the name given to towers or masses of masonry, somewhat resembling truncated pyramids, placed one on each side at the entrance of temples, and having a very imposing appearance.

Behind them in the larger temples there was often a large open court, and in front there might be an avenue with sphinxes on either side. An entrance of which these pylons form part is sometimes called a *propylon*. See *Egypt* (*Architecture*).

Pylorus (pī-lō′rus), the lower and right orifice of the stomach through which the food passes on to the intestine. See *Stomach*.

Pylos (pī′los), a town of ancient Greece, memorable in the Peloponnesian war, and represented by the modern Navarino.

Pym (pim), JOHN, an English statesman and leader of the popular party during the reigns of James I and Charles I, was born in Somersetshire in 1584; studied at Oxford and became famous as a lawyer. He entered Parliament in 1614, and during the reign of James he attained great influence by his opposition to the arbitrary measures of the king. He sat for Tavistock in all the parliaments of Charles' reign. In 1626 he took part in the impeachment of

John Pym.

Buckingham and was imprisoned. In the Short Parliament of 1640 Pym and Hampden were exceedingly active as leaders of the popular party, and in 1641 Pym was offered the chancellorship of the exchequer. He impeached Strafford, and at his trial appeared as accuser. He was the main author of the *Grand Remonstrance*, the final appeal presented in 1641, and one of the five members to arrest whom the king went to the House of Commons in January, 1642. When civil war became inevitable Pym was appointed one of the committee of safety, and while he lived was active in resisting the negotiation of any peace with the king which did not secure the liberties of the subject and the supremacy of parliament. It was mainly his financial skill that enabled the parliamentary army to keep the field. In Nov., 1643, he was made lieutenant-general of ordnance, and in the following month he died, and was buried in Westminster Abbey.

Pymma-wood, the wood of the *Lagerstræmia regīnæ*. See *Bloodwood*.

Pyramid (pir′a-mid), in geometry, is strictly a solid contained by a plane triangular, square, or polygonal base, and other planes meeting in a point. This point is called the vertex of the pyramid; and the planes which meet in the vertex are called the sides, which are necessarily all triangles, having for their bases the sides of the base of the pyramid. Every pyramid is one-third the solid content of a prism that has the same base and altitude as the pyramid. Pyramids are denominated triangular, square, pentagonal, etc., according as the base is a triangle, a square, a pentagon, etc.

Pyramid, in architecture, a colossal structure of masonry having a rectangular base and four triangular sides terminating in a point, used by the ancients in various parts of the world for sepulchers or for religious purposes, especially in Egypt. The largest and most remarkable of the Egyptian pyramids occur in several groups on the west side of the Nile, on the border of the Libyan desert, extending for a distance of about 25 miles from north to south, the farthest north being opposite Cairo. They are built chiefly of the hard limestone of the adjacent hills, but large blocks of granite brought from a distance are also used, especially on the outside. The four sides are so placed as to face the four cardinal points. Some of these structures belong to a very ancient date in the empire. The stones used varied in size, but are mostly large, and have required great mechanical skill to quarry them, transport them, and raise and adjust them in their proper places. An almost incredible number of laborers were engaged in erecting the chief Egyptian pyramids, of which the group of Gizeh, 4 miles s. w. of Cairo, in the neighborhood of the ancient Memphis, is the most remarkable. This group consists of nine pyramids, among them the three most celebrated of all, the pyramid of Cheops (Khufu), called the Great Pyramid; of Cephren (Khafra); and of Mycerinus (Menkauru). According to Herodotus, the Great Pyramid took 100,000 men

working for ten years to make a causeway 3000 feet long in order to facilitate the transport of the stone from the quarries; and the same number of men for twenty years more to complete the pyramid itself. Its base forms a square, each side of which was originally 768 feet, though now, by the removal of the coating, only 750 feet long, occupying 13 acres. The outer surface forms a series of steps, each of the average height of 3 feet or more. When the structure was perfect this step formation was hidden by the coating, which rendered the sides quite smooth, and the apex, where there is now a space of 12 sq. yards, was no doubt originally quite sharp. The height was originally about 480 feet, but is now only 451. The interior, entered 49 feet above the base of the north face, contains several chambers, one of which, called the King's Chamber, is 34¼ feet long, 17 wide, and 19 high, and contains a sarcophagus of red granite. The second pyramid is 690 feet square and 447 feet high. The third pyramid is only 354 feet square and 203 feet high, and is the best constructed of the three. The six smaller pyramids which complete the Gizeh group are of much inferior interest. The pyramids are supposed to have been built by the respective kings as tombs and memorials of themselves; and it is conjectured that they were begun at the beginning of each reign, and that their size corresponded with the length of it. About 350 yards southwest of the Great Pyramid is the celebrated Sphinx. Ruins of pyramids are to be found at Benares in India and in other parts of the East. Certain monuments of the ancient inhabitants, found in Mexico, are also called pyramids. These seem to have been intended to serve as temples, the tops of them being flat and surmounted by a house or chamber in which sacred rites were probably performed. The largest and perhaps the oldest of them is that of Cholula, which is said to have a base of 1770 feet and a height of 177 feet.

Pyr'amus and This'be, a pair of devoted lovers, who, as their story is told by Ovid (Met., iv, 55-165), resided in Babylon, and being prevented by their parents from meeting openly, were in the habit of secretly conversing through an opening of the wall, as their houses adjoined. They agreed one day to meet at the tomb of Ninus, when Thisbe, who was the first at the rendezvous, was surprised by a lioness and took to flight. In her haste she dropped her garment, which the lioness seizing, covered with blood, having immediately before killed an ox. Pyramus appearing on the scene, and concluding from the blood-besmeared robe that Thisbe was dead, killed himself. Thisbe returning soon afterwards, and finding the body of her lover, also killed herself. The story was very popular in the time of Shakespeare, who made it the subject of the burlesque interlude in *A Midsummer Night's Dream.*

Pyrenees (pir'ē-nēz), a lofty mountain range, the crest of the main chain of which forms the boundary between France and Spain. It abuts with one extremity on the Mediterranean, and with the other on the Atlantic. Its length, from Cape Creux on the Gulf of Lyons to Fontarabia on the Bay of Biscay, is about 280 miles, and its greatest breadth little more than 50 miles. It consists of two lines, which form parallel ridges about 20 miles from each other, except near the center, towards which the range rises both from the east and west. The descent on the south side is much more abrupt than on the north. Its loftiest summits are near its center, where its culminating point, Maladetta, or Pic de Néthou, reaches a height of 11,424 feet. The principal passes in the Pyrenees, formed by the meeting of valleys from opposite sides of the axis, take in the east part of the chain the name of Cols, and towards the center that of Ports. Only four of these are conveniently practicable for carriages. The portion crossed by the old Roman road from Perpignan to Figueras is now pierced by a railway tunnel between these two towns. In the Pyrenees is to be found some of the finest scenery in France. The climate, genial and warm, banishes perpetual snow to 1300 feet higher than the snow-line of the Alps. The French Pyrenees abound in mineral springs, in connection with which are some of the gayest watering places in Europe, chief among them Bagnères de Luchon. Barège is in a dreary gorge, but its waters are celebrated for their efficacy.

Pyrénées (pē-rā-nā), the French name of the Pyrenees, giving name to three French departments. — Basses-Pyrénées (bäs-pē-rā-nā) is a department of Southwestern France, at the angle of the Bay of Biscay. Its industry is mainly agricultural. The surface is diversified, there is much fine scenery, and the forests are extensive and valuable. Biarritz, its chief watering place, is well known as a health resort, especially in winter. Pau is the capital of the department. Area, 2943 sq. miles;

pop. 426,347.— HAUTES-PYRÉNÉES (ōt-pē-rā-nā) is a department of Southern France, bounded partly by Spain, partly by Basses-Pyrénées, and other departments. To it in the south belong some of the loftiest summits of the Pyrenees. The fine scenery and the mineral springs of the department attract many visitors. Area, 1749 square miles; pop. 212,173. Tarbes is the capital.— PYRÉNÉES-ORIENTALES (pē-rā-nā-zo-rē-aṇ-tâl), a department of Southern France, bordering on the Mediterranean and the Spanish frontier. Its chief wealth lies in its wines, of which the well-known Roussillon is one. The department is also very rich in iron. Perpignan is the capital. Area, 1592 square miles; pop. 212,121.

Pyrenees, PEACE OF THE, concluded between France and Spain by Cardinal Mazarin and De Haro, on the Ile des Faisans, in the river Bidassoa, on the borders of the two countries, November 7, 1659, terminated a war which had lasted for twenty-four years. By this treaty Spain ceded to France Roussillon, with the fortress of Perpignan, etc., so that the Pyrenees have since formed the boundary of the two kingdoms; and in the Netherlands, Artois, and part of Flanders, Hainault, and Luxemburg, with a number of fortified towns.

Pyrethrum (pi-reth'rum), a genus of herbaceous plants nearly allied to *Chrysanthemum*. *P. Parthenium* is known as feverfew; from *P. roseum* is made the well-known Persian insect-powder.

Pyrgos (pir'gōs), a town of Greece, near the west coast of the Morea, and not far from the mouth of the Ruphia (Alpheios). Its harbor is at Katakolo, to which there is a railway, and it carries on a considerable trade. Pop. (1907) 13,690.

Pyrheliometer (per-hē-li-om'e-ter), an instrument devised by M. Pouillet for measuring the intensity of the heat of the sun. It consists of a shallow cylindrical vessel of thin silver or copper, containing water or mercury in which a thermometer is plunged. The upper surface of the vessel is covered with lampblack, so as to make it absorb as much heat as possible, and the vessel is attached to a support in such a way that the upper surface can be always made to receive the rays of the sun perpendicularly. The actual amount of heat absorbed by the instrument is calculated by ordinary calorimetrical means. The area of the exposed blackened surface and the amount of water or mercury which has been raised through a certain number of thermometric degrees being both of them known, the absolute heating effect of the sun, acting upon a given area under the conditions of the experiment, can be readily found.

Pyrites (pi-rī'tēz), a name given in mineralogy to various metallic sulphides, chiefly to the sulphides of copper and iron. Pyrites is largely used as a source of sulphur in the manufacture of sulphuric acid. It is a widely diffused and plentiful mineral, occurring in many different kinds of rocks. It is abundant in many coal seams, and is apt to become so heated by the action of water and air, which change it into sulphate of iron, as to set fire to the coal. Copper pyrites, called also yellow copper and chalcopyrite, is the most abundant of all the ores of copper, and yields a considerable portion of the world's copper. The color of pyrites has often caused it to be mistaken for gold, of which there is a notable instance in the early history of Virginia. For iron pyrites see *Iron*.

Pyritz (pē'ritz), an ancient town of Prussia, 24 miles southeast of Stettin. Its chief industries are machinery, sugar manufacture, and agriculture. Pop. (1905) 8600.

Pyrmont (pir'mont), a watering place of Prussia, in the principality of Waldeck and Pyrmont (which see), 34 miles s. s. w. of Hanover. Small but well built, with several fine promenades, it contains a palace, and a very complete bathing establishment. The water is chalybeate, possessing valuable medicinal properties. Over 100,000 bottles of water are annually exported. Pop. 1500.

Pyro-electricity (pī'rō), a name given to electricity produced by heat, as when tourmaline becomes electric by being heated between 10° and 100° Centigrade.

Pyrogallic Acid (pī-rō-gal'ik; $C_6H_6O_3$), an acid obtained by the dry distillation of gallic acid (which see). It forms crystals that have neither smell nor color, is readily soluble in water, alcohol and ether, has a neutral reaction, readily absorbs oxygen in an alkaline solution, and becomes of a dark brown color. It is used in photography, and sometimes as a hair-dye.

Pyr'ola. See *Wintergreen*.

Pyroligneous Acid (pī-ru-lig'ne-us), an impure acetic acid obtained by the distillation of wood.

Pyrolusite (pī-ru-lū'sīt), a black ore of manganese, occurring crystallized and massive in Devonshire,

Warwickshire, Thuringia, Brazil and other places. It is the binoxide, dioxide, or peroxide of manganese, and is much used in chemical processes.

Pyrometer (pī-rom′e-ter), any instrument, the object of which is to measure all gradations of temperature above those indicated by the mercurial thermometer. Wedgwood's pyrometer, the first which came into extensive use, was used by him for testing the heat of his pottery and porcelain kilns, and depended on the property of clay to contract on exposure to heat. Many different modes have been proposed or actually employed for measuring high temperatures; as by contraction, as in Wedgwood's; by the expansion of bars of different metals; by change of pressure in confined gases; by the amount of heat imparted to a cold mass; by the fusing point of solids; by color, as red and white heat, etc.

Pyrope (pī′rōp), fire-garnet or Bohemian garnet, a dark-red variety of garnet, found embedded in trap tufa in the mountains of Bohemia. It occurs also in Saxony in serpentine.

Pyrophone (pī′ru-fōn), a musical instrument, in which the various notes are produced by the burning of hydrogen gas within glass tubes of various sizes and lengths.

Pyroscope (pī′ru-skōp), an instrument for measuring the intensity of heat radiating from a hot body or the frigorific influence of a cold body.

Pyrosis (pī-rō′sis), in medicine, a disease of the stomach attended with a sensation of burning in the epigastrium, accompanied with an eructation of watery fluid, usually insipid, but sometimes acrid. It is commonly called *Waterbrash.*

Pyrosoma (pī-ru-sō′ma), a genus of phosphorescent Molluscoida, of the group Tunicata, compound ascidians inhabiting the Mediterranean and Atlantic. They unite in great numbers, forming a large hollow cylinder, open at one end and closed at the other, swimming in the ocean by the alternate contraction and dilatation of its component individual animals.

Pyrotechny (pī-ru-tek′ni), the science of making and using artificial fireworks, the chief ingredients of which are niter, sulphur, and charcoal. Iron filings yield bright red and white sparks. Steel filings and cast-iron borings contain carbon, and give a more brilliant fire with wavy radiations. Copper filings give flame a greenish tint, those of zinc a fine blue color; the sulphuret of antimony gives a less greenish blue than zinc, but with much smoke; amber, resin, and common salt give a yellow fire. Lampblack produces a very red color with gunpowder, and a pink with niter in excess. Verdigris imparts a pale green, sulphate of copper and sal ammoniac a palm-tree green. Lycopodium, used also in the manufacture of stage-lightning, burns with a rose color and a magnificent flame. See *Fireworks.*

Pyroxylic Spirit (pī-roks-il′ik), a common name for methylic alcohol or wood-spirit. See *Methyl.*

Pyroxyline (pī-roks′i-lin), a term embracing guncotton and all other explosive substances obtained by immersing vegetable fiber in nitric or nitrosulphuric acid, and then suffering it to dry. These substances are nitroderivatives of cellulose.

Pyrrha. See *Deucalion.*

Pyrrhic Dance (pir′ik), an ancient Grecian warlike dance, which consisted chiefly in such an adroit and nimble turning of the body as represented an attempt to avoid the strokes of an enemy in battle, and the motions necessary to perform it were looked upon as a kind of training for war.

Pyrrho (pir′rō), a Grecian philosopher of Elis, founder of the Pyrrhonian or skeptical school, flourished about 340 B.C. He was early led to apply himself to philosophy by the writings of Democritus, and, accompanying his master, Anaxarchus, to India, in the train of Alexander the Great, he there became acquainted with the doctrines of the Brahmans, Magi, and other eastern philosophers. Spending a great part of his life in solitude, and abstaining from all decided opinions concerning moral and physical phenomena, he endeavored to attain a state of tranquillity not to be affected by fear, joy, or sorrow. He died in his ninetieth year; the Athenians erected a statue in honor of him, and his countrymen, who had made him a high-priest, raised a monument to his memory. His chief doctrines were the uncertainty of all human knowledge, and the belief that virtue is the only good. Pyrrho left no writings. It is only from the works of his later followers, particularly Sextus Empiricus, that we learn the principles of his school. A disposition to doubt is often called, from this philosopher, *Pyrrhonism.*

Pyrrhus (pir′rus), king of Epirus, one of the most notable generals of antiquity, was born about 318

B.C., and was left an orphan in childhood. He was placed on the throne of his ancestors when about twelve years of age, and reigned peacefully five years, when advantage was taken of his absence to transfer the crown to his great-uncle, Neoptolemus. After serving with his brother-in-law, Demetrius Poliorcetes, and greatly distinguishing himself at the battle of Ipsus, against Antigonus, B.C. 301, Pyrrhus recovered his dominions, which he shared with his rival, and then caused the latter to be put to death. He next contended for possession of Macedonia, and in 280 passed over into Italy to assist the Greeks against Rome. He defeated the Romans in two battles, but with severe loss to himself; then passed over into Sicily, returned to Italy again, and was defeated at Beneventum 275 B.C. He now retired to Epirus, took part in the Greek troubles, and was killed at Argos, B.C. 272.

Pyrus (pī′rus), a genus of ornamental and fruit trees, the latter forming the chief of our orchard fruit, and belonging to the pomeous section of the nat. order Rosaceæ. There are about forty species, natives of the north temperate and cold regions. The pear (*P. communis*), the apple or crab (*P. Malus*), service-tree (*P. torminālis* and *domestica*), mountain-ash or rowan-tree (*P. Aucuparia*), beam-tree (*P. Aria*), etc., all belong to this genus.

Pythagoras (pi-thag′o-ras), a Grecian philosopher, supposed to have been born about 586 B.C. at Samos. He went to Scyros, and was a scholar of Pherecydes till the death of the latter; others make him also a scholar of Thales and Anaximander. He is said to have gathered knowledge from the philosophers or learned men of Phœnicia, Syria, Egypt, Babylon, India, etc., but eventually settled at the Greek city of Crotona in Lower Italy, probably about 529 B.C. His abilities and character led great numbers, chiefly of the noble and wealthy classes, to adopt his views. Three hundred of these were formed into a select fraternity or order, and were bound by vow to Pythagoras and each other, for the purpose of cultivating the rites and observances enjoined by their master, and studying his philosophy. They thus formed at once a philosophical school and a religious order. The political influence of this body became very considerable, and was exerted in the interest of the aristocratic party. The democratic party strenuously opposed the growing power of the order, and their enmity caused Pythagoras to retire to Metapontum, where he died about 506 B.C. So far as we can judge, his system appears to owe very much to a vivid imagination acting upon the then prevailing ignorance respecting the order of nature. What was not known was guessed at, with the usual result. In the case of Pythagoras, as in that of other teachers of those early times, the popular effect of this partial knowledge was heightened by mingling it with secret doctrines. One of these doctrines was the transmigration of souls; and Pythagoras is said to have believed himself to have previously lived in several bodies. He had also abstruse theories respecting numbers, geometry, and music, which he valued very highly as fitting the soul for contemplation. The effect of his teaching, however, was such that his disciples are said to have paid him divine honors after his death. In appearance he was grave, commanding, and dignified. He abstained from all animal food, limiting himself to a vegetable diet. His public instruction consisted of practical discourses in which he recommended virtue and dissuaded from vice, with a particular reference to the various relations of mankind, as those of husbands and wives, parents and children, citizens and magistrates, etc. His disciples were required to practice the greatest purity and simplicity of manners. He imposed upon them, it is said, a silence of from two to five years, according to circumstances. He alone who had passed through the appointed series of trials was allowed to hear the word of the master in his immediate presence. To the initiated the doctrines were not delivered, as to others, under the mask of images and symbols, but unveiled. Pythagoras left no writings, the *Golden Sentences* extant under his name having been composed or compiled by later hands.

Pythagorean Bean (pith-ag-u-rē′-an), the *Nelumbium speciosum*. See *Nelumbium*.

Pythagorean Theorem, the forty-seventh proposition of the first book of *Euclid's Elements*, which shows that in any right-angled triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Pytheas (pith′e-as), a famous navigator of the Greek colony of Massilia, now Marseilles, supposed to have lived about the time of Alexander the Great (say 330 B.C.). He is reputed to have sailed along the west coast of Europe, entered the English Channel, and traveled some distance in Britain, then, continuing his journey northward, to have arrived at Thule (supposed to be Iceland). In a second voyage he en-

tered the Baltic, where he proceeded as far as a river which he called Tanais, and on the banks of which amber was found. We only know of him through Strabo, Pliny, and others.

Pythian Games (pith'i-an), one of the four great Grecian games, instituted in honor of Apollo, and celebrated at Delphi. Until about 586 B.C. they were under the management of the Delphians, and took place every eighth year; but after that date they were conducted by the Amphictyons, and celebrated every fourth year, prizes being given for flute-playing, athletic sports, and horse and chariot racing. Eventually contests in tragedy, painting, sculpture, etc., were added. At first prizes of silver or gold were awarded, but afterwards the simple laurel wreath and palm branch were substituted. They continued to be celebrated until the end of the fourth century of our era.

Pythias, Knights of, a benevolent and friendly order, founded in the United States in 1864, and now strong in this country and flourishing in some other countries. It had a membership in 1911 in the United States of 711,381. It has an insurance department with a membership numbering 69,989, representing an aggregate life insurance of $98,527,523.

Python (pī'thon), a genus and family of serpents allied to the family Boidæ or Boas. They are not venomous, but kill their prey by compression. The pythons belong exclusively to the Old World, and are of enormous size, sometimes attaining a length of 30 feet. They are found in India and in the islands of the Eastern Archipelago, in Africa and in Australia. A rudimentary pelvis and traces of hinder limbs exist in the pythons, these structures terminating externally in a kind of hooked claw. The head exceeds the neck in thickness, and the mouth is extremely large. Aided by their prehensile tails and rudimentary hinder limbs, the pythons suspend themselves from the branches of trees and lie in wait near water for animals which come to drink. The genus *Python* contains various species, the best known of which is the West African python (*P. sebæ*), common in menageries. The female python hatches her eggs by the heat of her body.

Pythoness (pī'thon-es), the priestess of Apollo at his temple at Delphi, who gave oracular answers. See *Delphi.*

Pyx (piks; Greek, *pyxis*, a box), a covered vessel used in the Roman Catholic Church to contain the consecrated host. In ancient times, although generally rectangular in shape, it sometimes had the form of a dove, and was suspended above the altar. It is now cylindrical, cup or bell shaped, with a cross-surmounted cover, and is frequently delicately chased and inlaid.

Pyx, Trial of the, the final trial by weight and assay of the gold and silver coins of the United Kingdom, prior to their issue from the mint, a certain number being taken and tested by way of sample of the whole. The trial takes place periodically by a jury of goldsmiths summoned by the lord-chancellor, and constitutes a public attestation of the standard purity of the coin. The term is also applied to the assaying of gold and silver plate, which takes place at the different assay offices.

Pyxidium (piks-id'i-um), in botany, a capsule with a lid, as seen in henbane and in the fruit *Lecythis Ollaria*, the monkey-pot tree, a large forest tree of Brazil. The term is also applied to the theca of mosses.

Q

Q, the seventeenth letter in the English alphabet, a consonant having the same sound as *k* or hard *c*. It is a superfluous letter in English, as the combination *qu*, in which it always occurs, could be equally well expressed by *kw* or *k* alone when the *u* is silent. It did not occur in the Anglo-Saxon alphabet, the sound *qu* in Anglo-Saxon words being regularly written *cw* or *cu*, but was borrowed from the French-Latin alphabet.

Quackenbos (kwak'in-bos), JOHN DUNCAN, author, born at New York in 1848. He became a doctor; a tutor in rhetoric at Columbia College in 1870; professor of rhetoric at Columbia and at Barnard College for Women after 1891; professor *emeritus* at Columbia in 1894. He has written numerous school books and other works, including *Hypnotic Therapeutics* and *Enemics and Evidences of Christianity.*

Quadi (kwa'dē), a Teutonic tribe whose ancient territory was on the Danube, extending to the Theiss on the east and to the Carpathian Mountains on the north. They long waged destructive wars with the Romans, particularly under Marcus Aurelius, but cease to be heard of in the fifth century, having probably migrated further west with the Suevi.

Quadragesima (kwod-ra-jes'i-ma), a Latin word signifying fortieth, and used to denote the forty days of fast (Lent), preceding Easter. Quadragesima Sunday is the first Sunday in Lent. See *Lent.*

Quadrangle (kwod'ran-gl), in geometry, a quadrilateral figure; a plane figure having four sides, and consequently four angles. In ordinary language it is a square or quadrangular court surrounded by buildings, as often seen in the buildings of a college, school, or the like.

Quadrant (kwod'rant), an instrument for measuring angular altitudes, variously constructed and mounted for different specific uses in astronomy, navigation, surveying, etc., consisting originally of a graduated arc of 90°, with an index or vernier, and either plain or telescopic sights, along with a plumb-line or spirit-level for fixing the vertical or horizontal direction. Its principle and application is the same as that of the sextant, by which it is superseded. See *Sextant.*

Quadrate Bone (kwod'rāt), a bone developed in reptiles and birds, by means of which the lower jaw is articulated or joined to the skull. The lower jaw of these forms is thus not articulated directly or of itself to the skull, as in mammals.

Quadratic Equations. See *Equation.*

Quadrature (kwod'ra-tūr), in astronomy, the position of the moon or a planet when its longitude differs from that of the sun by 90°; that is, when it is 90° distant from the sun.— *Quadrature of the circle,* the squaring of the circle. See *Circle.*

Quadriga (kwod-rī'ga), an ancient two-wheeled car or chariot drawn by four horses abreast. It was used in racing in the Greek Olympian games, and in the games of the Roman circus.

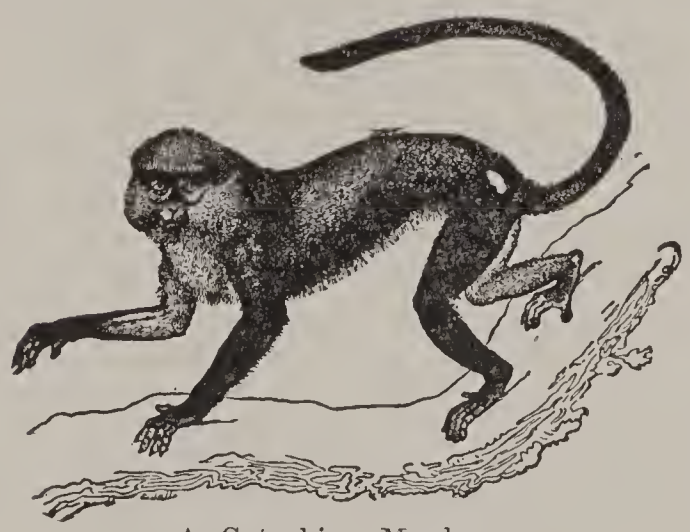
Quadrilateral (kwod-ri-lat'er-al), a name given to the space inclosed between, and defended by, four fortresses in Northern Italy famous in Austro-Italian history, namely, Peschiera and Mantua on the Mincio, and Verona and Legnago on the Adige.

Quadrille (kwod-ril'), a dance of French origin, which consists generally of five consecutive figures or movements, danced by four sets of couples, each forming the side of a square.

Quadrille, a game at cards, played by four persons, with a pack of forty cards, the eight, nine and ten of each suit being thrown aside. Quadrille was very popular and fashionable in England about the beginning of the century, but is now almost forgotten. *Ombre,* the game celebrated by Pope in his Rape of the Lock, is essentially the same game, but played by three persons instead of four.

Quadrivium (kwod-riv'i-um), the name given by the schoolmen of the middle ages to the four mathematical branches of study, arithmetic, music, geometry, and astronomy.

Quadrumana (kwod-rö'ma-na, or 'four-handed'), the name applied by Cuvier and others to denote the order of mammalia represented by the lemurs, monkeys, and apes, from the fact that these forms agree in possessing a great toe so constructed as to be capable of opposing the other digits of the feet, instead of being placed parallel with the other toes, thus forming a kind of 'hand' adapted for supporting the foot on the ground. This conversion of the feet into hand-like organs presented to Cuvier's mind so different and remarkable a structure from the disposition of the feet and toes of man, that he separated man as a sole and single genus to



A Catarhine Monkey.
(*Cercopithecus mona*).

represent the distinct and opposing order of *Bimana* or 'two-handed' mammalia. But in modern zoology this distinction is held not to exist anatomically, and man is generally included in one order with the apes and monkeys — the order Primates, of which man constitutes a distinct family or section. As limited to the apes, monkeys, and lemurs, the Quadrumana are characterized by the following points: — The hallux (innermost toe of the hind-limb) is separated from the other toes, and is opposite to them, so that the hind-feet become prehensile hands. The pollex (innermost toe of the fore-limbs) may be wanting, but when present it also is usually opposable to the other digits, so that the animal becomes truly quadrumanous, or four-handed. The teats are two in number, and the mammary glands are on the chest as in man. See *Lemurs*, *Monkeys*, *Apes*, etc.

Quadruped (kwod'rö-ped), the name popularly applied to those higher vertebrate animals which possess four developed limbs. The name is usually restricted to four-footed mammals.

Quadruple Alliance (kwod'rö-pl), an alliance, so-called from the number of the contracting parties, concluded in 1718 between Great Britain, France, and Austria, and acceded to by Holland in 1719, for the maintenance of the Peace of Utrecht. The occasion of the alliance was the seizure by Spain of Sardinia in 1717, and Sicily in 1718, both of which she was forced to give up. Another quadruple alliance was that of Austria, Russia, Great Britain, and Prussia, in 1814, originating in the coalition which had effected the dissolution of the French Empire.

Quæstor (kwēs'tur), the name of certain magistrates of ancient Rome whose chief office was the management of the public treasure, being receivers of taxes, tribute, etc. Quæstors accompanied the provincial governors and received taxes, paid the troops, etc. The office could at first be held only by patricians until 421 B.C., when the number, which had formerly been two, was doubled, and plebeians became eligible. The number was further increased to eight after the outbreak of the first Punic war. As province after province was added to the Roman territory the number of quæstors was again increased, till under Sulla it reached twenty, and in the time of Julius Cæsar forty.

Quagga (kwag'a; *Equus Quagga*), a species of the horse genus, nearly allied to the zebra, and formerly found abundantly on the plains of Southern Africa, south of the Vaal River. Though striped like the zebra, it possessed no bands on the limbs; of a dark or blackish-brown on the head, neck, and shoulders, the back and hind quarters were of a lighter brown, while the croup was of a russet gray. The under parts of the body were white, the upper parts of the legs and tail being marked by whitish bars. The quagga was of smaller size than the zebra, and in general conformation bore a closer resemblance to the horse. Gregarious in habits, the quagga is said to have mingled indiscriminately with the zebra herds. Its food consisted of grasses and mimosa leaves. It is now said to be absolutely extinct, having been hunted indiscriminately by the Boers, who killed thousands of them for their skins. In this respect its fate resembles that of the bison of America. The ani-

mal to which the name quagga is now applied is Burchell's zebra. See *Dauw*.

Quail (kwāl; *Coturnix*), a genus of rasorial birds, included in the family of the partridges, to which they are nearly allied, but from which they differ in being smaller, in having a relatively shorter tail, no red space above the eye, longer wings, and no spur on the legs. The common quail (*C. vulgāris*) is a migratory bird, and is found in every country of Europe, and in many parts of Asia and Africa. It is about 8 inches in length. The color of the upper parts is brownish with lighter and darker markings, of the under parts yellowish. The quail is very pugnacious, and in some places quail fights are a form of amusement, as was the case also in ancient times. Its flesh is deemed excellent food, and large numbers are brought alive and dead from the Continent to the British markets. In Britain these birds arrive early in May, and depart southwards in October. There are several other species, in appearance and habits not greatly differing from the common quail, as the Coromandel quail (*C. textilis*), the Australian quail (*C. australālis*), the white-throated quail (*C. torquāta*), the Chinese quail (*C. excalfactoria*), an elegant little species measuring only 4 inches in length, etc. The name quail is given in the United States to some birds of other genera, as the Virginia quail, or partridge (*Ortyx*), and the Californian or crested quail (*Lophortyx*). The Virginian quail is common throughout North America, and extends as far south as Honduras. It is rather larger than the European quail. The flesh is very white and tender, and is unequaled in delicacy by any other member of its order in America.

Common Quail (*Coturnix vulgāris*).

Quakers (kwā'kerz), or FRIENDS, a society of Christians which took its rise in England about the middle of the 17th century. George Fox, a native of Drayton, in Leicestershire, was the first to teach the religious views which distinguish the society. He commenced his ministerial labors in 1647, and immediately fell under persecution. But persecution, as usual, enlisted the sympathies of many in his cause. After making multitudes of converts he organized them into a church, which became, although not until after severe persecution, one of the recognized sects of Christianity. Among the eminent members of the society in its early days we may mention William Penn, Robert Barclay, George Whitehead, Stephen Crisp, Isaac Pennington, John Crook, Thomas Story, etc. The early Quakers were marked as a peculiar people by their testimonies against oaths, a paid ministry, and tithes; their use of the singular pronouns when addressing only one person; their refusal to take off the hat as a compliment to men; the plainness of their apparel; and their disuse of the ordinary names of the months and days. The name Quakers was given to them in derision, and though they accepted the name they call themselves by that of Friends. A Derby magistrate was the originator of the derisive epithet according to Fox himself —'because I made him tremble at the word of God.' The persecution and intolerance, of which they were the victims both in England and America, only tended to confirm the faith and strengthen the bond of union among the members of the rising society; and in neither country could it induce the sufferers to relinquish their conformity to what they regarded as duty. From the diffusion of more enlightened views on the subject of religious liberty, acts were successively passed by the English parliament relieving Friends from the oppression under which they suffered, tolerating their mode of worship, marriage, etc., and allowing them in a court of justice to make an affirmation in place of taking an oath in the usual way. The same liberal policy was pursued in America. One of the brightest chapters in the annals of the sect is that relating to the founding of the colony of Pennsylvania. (See *Penn, William, Pennsylvania.*) But, as in other reforming sects, so among the Friends, success in the course of time gradually undermined their zeal, and deprived them of many of their characteristic qualities. Gradually the spread of wealth modified the stringency of their 'sumptuary' rules, and there was in consequence a rapid decline of the ancient discipline. Coincident with these relaxations of rule arose disputes as to doctrine. About the year 1827 Elias Hicks, a native of the state of New York, created a schism in the society by promulgating opinions denying the miraculous conception, divinity, and atonement

of Christ, and also the divine authority of the Scriptures. One-fourth the sect in America followed Hicks, and have since been known as Hicksite Friends. The schism made much stir among Friends in Great Britain as well as in America, and a movement was begun in favor of higher education, and of a relaxation in the formality of the society. This movement, headed by Joseph John Gurney of Norwich, was strenuously opposed by a body of Friends in America, and the result was a division among the Orthodox Friends themselves, and the origin of a new sect, known as Wilburites, from John Wilbur, its founder.

The society, or the orthodox section of it, believes that, under the gospel dispensation, all wars and fightings are strictly forbidden; the positive injunction of Christ, 'Love your enemies,' etc., entirely precluding the indulgence of those passions from which only such contests can arise. They also believe that the express command, 'Swear not at all,' prohibits the Christian from the use of judicial as well as other oaths. In like manner, following the spirit of the Scriptures, they believe that a special call is necessary to constitute a true minister of the gospel, that the faithful minister should not preach for a pecuniary reward, that the essential baptism is of the Holy Ghost, not by water, and that the Lord's supper is also entirely of a spiritual nature. They therefore renounce both these sacraments so far as the ordinary outward forms are concerned. As to the cardinal doctrines of Christianity, the incarnation, crucifixion, resurrection, redemption through Christ's death, justification, etc., their beliefs are similar to those of orthodox Christians generally. The Friends were one of the first sects to allow women to teach publicly. As early as 1727 they censured the traffic in slaves, and the efforts of the society had a great influence in bringing about their emancipation. They object to balls, gaming places, horse races, theaters, and music; also to the reading of plays, romances, and novels; and enjoin plainness of dress and the avoidance of ornaments.

The society is governed by its own code of discipline, which is enacted and supported by meetings of four degrees for discipline — namely, preparative, monthly, quarterly, and yearly meetings. The preparative digest and prepare the business for the monthly meetings, in which the executive power is principally lodged, subject, however, to the revision and control of the quarterly meetings, which are again subject to the supervision and direction of the yearly meetings. There are about 60,000 members and adherents in Britain, 120,000 in the United States, besides small numbers in other countries.

Quaking Grass (*Briza*), a genus of grasses, so-named from their spikelets being always in a state of tremulous motion, in consequence of the weakness of the footstalks by which they are supported. *Briza maxima*, a native of Southern Europe, has long been cultivated as a garden annual on account of its large and handsome drooping spikelets. *B. media*, a perennial plant, is naturalized in the vicinity of Boston, its flowers forming elegant panicles.

Quamash (kwam'ash), the North American name of *Camassia esculenta*, a plant of the lily family with an edible bulb. These bulbs are much eaten by the Indians, and are prepared by baking in a hole dug in the ground, then pounding and drying them into cakes for future use.

Quamoclit (kwam-ok'lit), a genus of climbing ornamental plants, nat. order Convolvulaceæ, chiefly found in the hot parts of America, but some species are indigenous both in India and China.

Quandang (kwan'dang), the edible fruit of a species of sandalwood tree, *Santălum acuminātum*, called in Australia native peach.

Quangsee. See *Kwangsi.*

Quangtung. See *Kwangtung.*

Quantity (kwon'ti-ti), that property of anything, in virtue of which it is capable of being measured, increased, or diminished, relating to bulk, weight, or number. In mathematics a quantity is anything to which mathematical processes are applicable. In grammar it signifies the measure of a syllable, or the time in which it is pronounced — the metrical value of syllables as regards length or weight in pronunciation. In Latin and Greek poetry quantity and not accent regulates the measure.

Quantock Hills (kwan'tok), a range of low elevation in England, in the county of Somerset, extending from the Bristol Channel, near Watchet, northeast to between Bridgewater and Taunton, and rising at their highest point to an elevation of 1428 feet above the sea-level.

Quanza, a river of Africa. See *Coanza.*

Quappelle (ka-pel'), a small town on the Canadian Pacific

Railway, in the district of Assiniboia, a short distance east of Regina; also, the name of a river tributary to the Assiniboine.

Quarantine (kwor'an-tēn; It. *quarantina*, a space of forty days), the period (originally forty days) during which a ship coming from a port suspected of contagion, or having a contagious sickness on board, is forbidden intercourse with the place at which she arrives. This form of quarantine is confined to countries where cholera, yellow fever, etc., have to be guarded against. By act of Congress passed in 1888 national quarantine stations were established; and it is made a misdemeanor, punishable by fine or imprisonment, or both, for the master, pilot, or owner of any vessel entering a port of the United States in violation of the act, or regulations framed under it. Quarantine was first introduced at Venice in the fourteenth century. In Britain it is now practically abolished, the port sanitary authorities dealing with any case reported to them.

Quaregnon (kâ-ren-yōṇ), a commune and colliery district of Belgium, province of Hainaut, 4 miles west of Mons. It has coal mines and blast furnaces. Pop. 16,033.

Quarles (kworlz), FRANCIS, an English poet, born in 1592, near Rumford in Essex, educated at Cambridge, and entered at Lincoln's Inn. He was for some time cup-bearer to Elizabeth, queen of Bohemia, and in 1621 went to Dublin, where he became under-secretary to Archbishop Ussher. He was driven from Ireland, with the loss of his property, by the rebellion of 1641, and was appointed chronologer to the city of London. At the commencement of the civil wars he wrote a work entitled the *Loyal Convert*, which gave offense to the parliament; and when he afterwards joined the king at Oxford his property was sequestrated, and his books and MSS. plundered. He was so much affected by his losses, that grief is supposed to have hastened his death in 1644. Of the works of Quarles, in prose and verse, the most celebrated is his *Emblems*, a set of designs illustrated by verses. Among his poems are *Divine Poems*, *Divine Fancies*, and *Argalus and Parthenia*. His *Enchiridion* is a collection of brief essays and aphorisms, in vigorous and occasionally eloquent language.

Quarnero (kwär-nā'rō), GULF OF, in the Adriatic Sea, between Istria and the Croatian coast, 15 miles in length and breadth. It is nearly inclosed leewards by the islands of Cherso and Veglia, and communicates with the Adriatic by three channels. The seamen of that region dread the gulf on account of the terrific storms to which it is subject.

Quarrel (kwor'el), a bolt or dart to be shot from a cross-bow, or thrown from a catapult, especially one with a square head and pyramidal point.

Quarrel.

Quarry (kwor'i), an open excavation made for obtaining stone, such as granite, marble, sandstone, limestone, and slates. Stones suitable for important building purposes are usually found at a good distance below the surface. In the case of unstratified rocks, such as granite, whinstone, etc., the stone is most frequently detached from the mass by blasting, a process by which much valuable stone is wasted, and a different method is employed whenever it is found possible. This is frequently the case with some stratified rocks, such as sandstone, from which blocks are separated by hand-tools alone. Small holes a few inches asunder are cut along a certain length of rock, into which steel wedges are inserted. These are driven in by heavy hammers until the stratum is cut through. The large blocks necessary for monumental purposes are generally obtained in this way, and before they leave the quarry they are usually reduced as nearly as possible to a rectangular form.

Quart (kwort), a measure of capacity, being the fourth part of a gallon, or eight gills.

Quartan Ague. See *Ague*.

Quarter (kwor'ter), the name of two measures, one of weight and the other of capacity. The first is the fourth part of a hundredweight, or 28 lbs. The second contains 8 bushels of 4 pecks.

Quarter, that part of a ship's side which lies towards the stern, or which is comprehended between the aft-most end of the main chains and the sides of the stern.

Quarter-days, in England, the day that begins each quarter of the year. They are Lady-day (March 25), Midsummer-day (June 24), Michaelmas-day (September 29), Christmas-day (December 25). These days have been adopted between landlord and tenant for entering or quitting lands or houses and for paying rent. In Scotland the legal terms are, Whitsunday (May

15), and Martinmas (November 11); the conventional terms Candlemas (February 2), and Lammas (August 1) make up the quarter-days.

Quarter-deck, the upper deck, or aftermost part of the upper deck, of a vessel, extending from the main-mast to the stern, or to the poop (when there is one). In ships of war it is specially set apart for the officers.

Quartering (kwor'ter-ing), in heraldry, is dividing a coat into four or more quarters or quarterings, by perpendicular and horizontal lines, etc. See *Heraldry*.

Quarter-master (kwor'ter-mas'ter), in the army, an officer who attends to the quarters for the soldiers, their provisions, fuel, forage, etc. There is a quarter-master on the staff of each regiment, in which he holds the relative rank of lieutenant. A quarter-master in the navy is a petty officer appointed by the captain, who, besides having charge of the stowage of ballast and provisions, coiling of ropes, etc., attends to the steering of the ship.

Quartermaster-general, a staff officer of high rank in the army, whose department is charged with all orders relating to the marching, embarking, disembarking, billeting, quartering, and cantoning of troops, encampments and camp equipage. The quartermaster-general is attached to a whole army under a commander-in-chief, and holds the rank of brigadier-general.

Quartermaster-sergeant is a non-commissioned officer who acts as assistant to the quarter-master.

Quartern (kwor'tern), a term sometimes used to designate the fourth of a peck, or of a stone; as the quartern-loaf. In liquid measure it is the fourth part of a pint.

Quarter-sessions, in England, a general court of criminal jurisprudence held quarterly by the justices of the peace in counties, and by the recorder in boroughs. The jurisdiction of these courts, originally confined to matters touching breaches of the peace, has been gradually extended to the smaller misdemeanors and felonies, but with many exceptions. Similar courts have been introduced into the United States, and are closely connected with courts of Oyer and Terminer (which see).

Quarter-staff, an old English weapon formed of a stout pole about 6½ feet long, generally loaded with iron at both ends. It was grasped by one hand in the middle, and by the other between the middle and the end. In the attack the latter hand shifted from one quarter of the staff to the other, giving the weapon a rapid circular motion, which brought the loaded ends on the adversary at unexpected points.

Quartet, or QUARTETT (kwor-tet'), a musical composition for four instruments, generally stringed instruments (that is, two violins, one viola or tenor violin, and one violoncello); also a composition for four voices, with or without accompaniment.

Quarto (kwor'tō; 4to), a book of the size of the fourth of a sheet; a size made by twice folding a sheet, which then makes four leaves.

Quartz (kwortz), the name given to numerous varieties of the native oxide of silicon, called also silicic acid. Quartz embraces a large number of varieties. When pure its composition is expressed by the formula SiO_2. It occurs both crystallized and massive, and in both states is most abundantly diffused throughout nature, and is especially one of the constituents of granite and the older rocks. When crystallized it generally occurs in hexagonal prisms, terminated by hexagonal pyramids. It scratches glass readily, gives fire with steel, becomes positively electrical by friction, and two pieces when rubbed together become luminous in the dark. The colors are various, as white or milky, gray, reddish, yellowish or brownish, purple, blue, green. Quartz veins are often found in metamorphic rocks, and frequently contain rich deposits of gold. The principal varieties of quartz known by distinct names are the following: 1, *rock-crystal;* 2, *smoky quartz;* 3, *yellow quartz;* 4, *amethyst;* 5, *siderite* or *blue quartz;* 6, *rose quartz;* 7, *milky quartz;* 8, *irised quartz;* 9, *common quartz;* 10, *fat (greasy) quartz;* 11, *flint;* 12, *hornstone;* 13, *Lydian stone;* 14, *floatstone (swimming stone);* 15, *fibrous quartz;* 16, *radiating quartz;* 17, *chaleedony;* 18, *carnelian;* 19, *chrysoprase;* 20, *agate.* The name rock-crystal is applied to transparent and colorless crystals. Smoky quartz consists of crystals and crystalline masses which are translucent and of a brown color. Yellow quartz, sometimes called *Bohemian* or *Scottish topaz,* is transparent, and of various shades of yellow. Amethyst is of every shade of violet, and nearly transparent. Siderite is of an azure-blue color, and never in regular crystals. Rose quartz is of a rose-red color. Milky quartz is massive, translucent, and of a milk-white color.

Irised quartz exhibits the colors of the rainbow. Fat or greasy quartz has the appearance of having been immersed in oil. Flint has a more compact texture than common quartz, is dull, only translucent on the edges, of a brownish color, and breaks with a conchoidal fracture. Hornstone resembles flint, but its conchoidal fracture is less distinct. Lydian stone differs from flint chiefly in having a darker color, less translucency, and a fracture somewhat slaty; when black it is often called *basanite*. Floatstone consists of a delicate tissue of minute crystals, visible only under a powerful magnifier. Owing to the cavities it contains it will sometimes float on water. Fibrous quartz consists of those varieties which are in distinct parallel concretions. Radiating quartz is like fibrous quartz, except that the fibers diverge from a common center, and resemble the radii of a circle, instead of being parallel. Chalcedony includes those varieties of radiating quartz where the thickness of the individuals becomes so much diminished as to render them nearly or altogether impalpable. Carnelian differs from chalcedony merely in having a blood-red color. Chrysoprase also resembles chalcedony in composition, except that it is granular instead of fibrous; its color is apple-green. Agate implies the occurrence of two or more of the above varieties existing together in intimate union. Cat's eye, avanturine, prase, plasma, heliotrope, Compostella hyacinth, jasper (red, brown, striped, and porcelain), jasper agate, Mocha stone, Venus-hair agate, etc., formerly included under quartz, are only mixtures of this mineral with other substances. Several varieties of quartz are of important use in the arts and manufactures. The ancients regarded rock-crystal as petrified water, and made use of it for the fabrication of vases. At present it is employed not only for cups, urns, chandeliers, etc., but for seals, spectacle-glasses, and optical instruments. Quartz enters into the composition of glass, both white and colored. In the manufacture of porcelain it is added in the state of an impalpable powder, and forms part of the paste; it is also used in other kinds of pottery. Quartz is used as a flux in the melting of several kinds of ores, particularly those of copper, and in other metallurgical processes. Touchstone is a hard velvety-black variety of Lydian stone.

Quartzite (kwort'zīt), QUARTZ-ROCK, a metaphoric stratified granular-crystalline rock consisting entirely, or almost entirely, of quartz. It is usually a sandstone which has been altered by heat, etc. It is generally of a grayish or pinkish-gray color, from a slight trace of iron.

Quass (kwas), or KVASS, a sour, fermented liquor, made by pouring warm water on rye or barley meal, and drunk by the peasantry of Russia.

Quassia (kwash'i-a), a genus of South American tropical plants, consisting of trees and shrubs, natural order Simarubaceæ. The wood of two species is known in commerce by the name of *Quassia; Q. amāra*, a native of Panama, Venezuela, Guiana, and Northern Brazil, a small tree with handsome crimson flowers; and *Q. excelsa* (*Picræna excelsa*, Lindley), a native of Jamaica. The latter furnishes the *lignum quassiæ* of the British Pharmacopœia. Both kinds are imported in billets, and are inodorous, but intensely bitter, especially the Jamaica quassia. Quassia is a pure and simple bitter, possessing marked tonic properties. An infusion of quassia sweetened with sugar is useful to destroy flies. *Q. excelsa* was formerly substituted by some brewers for hops, but is now prohibited under severe penalties.

Quaternions (kwa-ter'ni-unz), the name given by Sir William Rowan Hamilton to a method of mathematical investigation discovered and developed by him. It is most important in its applications to physics, especially in crystallography, optics, kinematics, and electro-dynamics. According to the discoverer, 'A *Quaternion* is the quotient of two vectors, or of two directed right lines in space, considered as depending on a system of *Four Geometrical Elements;* and as expressible by an algebraical symbol of *Quadrinomial Form*. The science, or *Calculus*, of *Quaternions*, is a new mathematical method wherein the foregoing conception of a *quaternion* is unfolded, and symbolically expressed, and is applied to various classes of algebraical, geometrical, and physical questions, so as to discover many new theorems, and to arrive at the solution of many difficult problems.'

Quatre-Bras (kå-tr-brä), a village of Belgium, in the province of South Brabant, 20 miles S. S. E. of Brussels, situated at the intersection of the main roads between Brussels and Charleroi, and from Nivelle to Namur. It is famous for the battle fought here (June 16, 1815) between the English under Wellington and the French under Ney, in which the former were victorious.

Quatrefages de Bréau (kä-tr-fäzh dė brā-ō), JEAN LOUIS ARMAND DE, a French

naturalist, born in 1810; took his M.D. degree at Strasburg in 1838; and became professor of zoology at Toulouse, the Lycée at Paris, and professor of anatomy and ethnology at the Musée d'Histoire Naturelle. He was elected a member of the Royal Society, London, in 1879. His contributions to science include numerous researches into the lower grades of life, and a valuable series of anthropological studies. Among his more important works are *Souvenirs d'un Naturaliste* (1854), *Crania Ethnica* (1875-79), *De l'Espèce Humaine* (1877), *Hommes Fossiles et Hommes Sauvages* (1883), *La Distribution Géographique des Négritos* (1883), *l'Homme Tertiaire* (1885), *les Pygmées* (1887), and *Introduction à l'Étude des Raees Humaines* (1887-89). He died in 1892.

Quatrefoil (kwą'tėr-foil), in architecture, an opening or a panel divided by cusps or foliations into four leaves, or more correctly the leaf-shaped figure formed by the cusps. It is an ornament which has been supposed to represent the four leaves of a cruciform flower, and is common in the tracery

Quatrefoils.

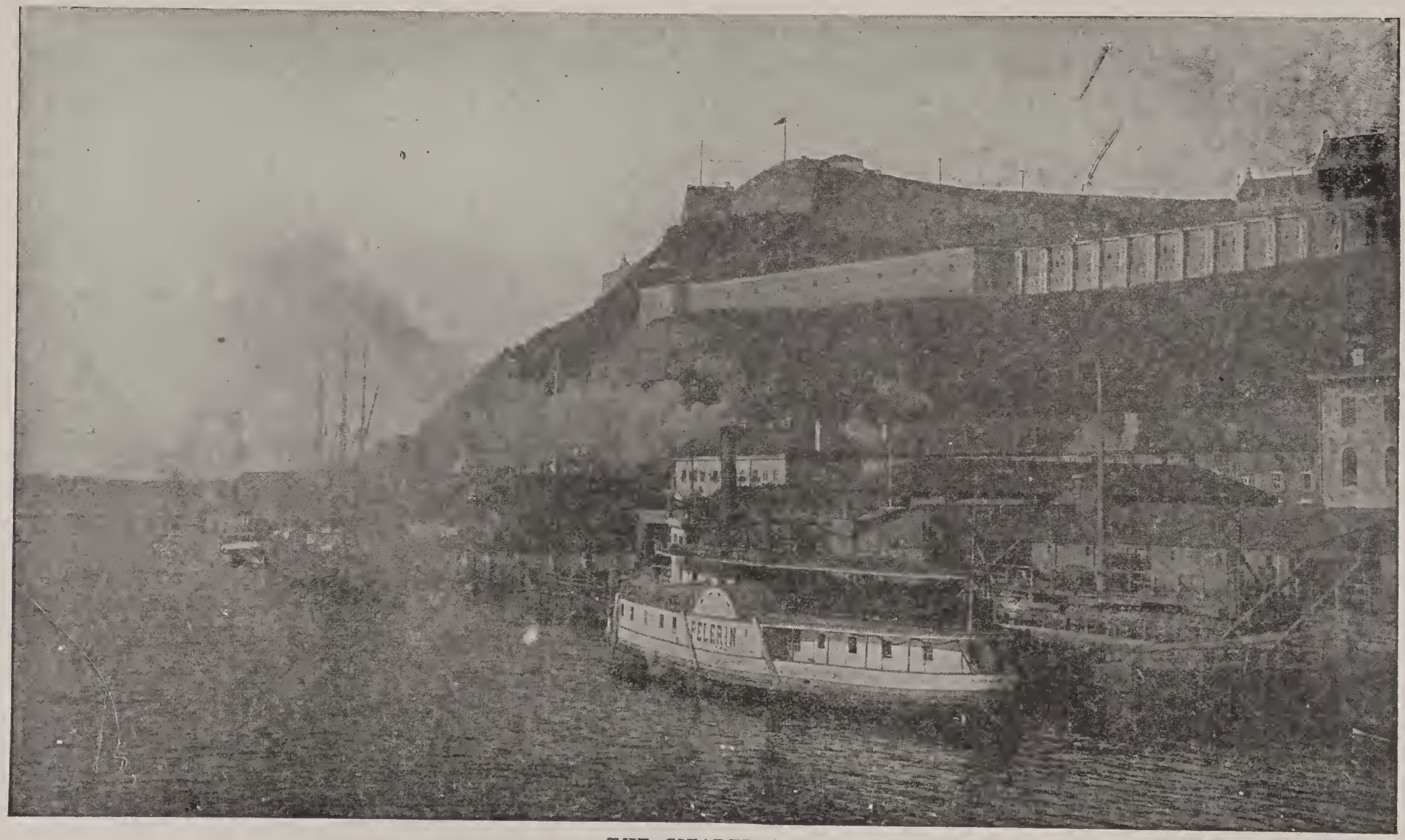
of Gothic windows. Bands of small quatrefoils are much used as ornaments in the perpendicular Gothic style, and sometimes in the decorated. The same name is also given to flowers and leaves of similar form carved as ornaments on moldings, etc.

Quaver (kwā'ver), a note and measure of time in music, equal to half a crotchet or the eighth of a semibreve. See *Music*.

Quay (kē), a landing-place substantially built along a line of coast or a river bank, or round a harbor, and having posts and rings to which vessels may be moored, frequently also cranes and storehouses for the convenience of merchant ships.

Quay (kwā), Matthew Stanley, political leader, born at Dillsburg, Pennsylvania, in 1833; died in 1904. He graduated at Jefferson College, was admitted to the bar, became a colonel in the Civil war, and was afterwards private secretary of the governor of Pennsylvania. Elected to the legislature in 1861, after holding other positions, he was elected State treasurer in 1885 and United States Senator in 1887. Shrewd and alert in political movements, he gradually gained leadership in and control of the Republican organization in Pennsylvania, what is called the 'political machine' reaching its highest development in his hands. In 1889 he was tried for misappropriation of public funds, but was acquitted. He was regarded as the ablest of leaders in 'machine' politics.

Quebec (kwē-bek'), a city and shipping port of the Dominion of Canada, capital of the province of the same name, situated on a promontory near the confluence of the St. Charles with the St. Lawrence, terminating abruptly in Cape Diamond, which has a height of 333 feet, and on the banks of both streams. It is about 400 miles from the mouth of the St. Lawrence and 140 miles northeast of Montreal, to which the river is navigable for large vessels. It is divided into the upper and lower towns. The former, placed on the summit of the promontory, is strongly fortified, the fortifications comprising a citadel and other works. The view from the heights here looking down the river is one of the finest in the world. The lower town, the great seat of business, lies under the cliffs, along the St. Lawrence and the St. Charles. The streets are mostly narrow, irregular, and frequently steep, excepting in the suburbs, which are modern and built upon a more regular plan. Among the principal edifices are the parliament buildings, the Roman Catholic cathedral, the Protestant cathedral, the new court-houses, the new town-hall, and the Scotch church. The chief educational institution is Laval University, with faculties of law, medicine, theology, and arts, and a library of nearly 80,000 volumes. Another great educational institution is the Grand Seminary. The chief convent is the Ursuline convent, covering 7 acres of ground, and having connected with it an extensive establishment for the education of females. It has buildings dating from 1686. Much of the town has an antique aspect. On the Plains of Abraham, west of the upper town, a column 40 feet high has been erected to the memory of General Wolfe; while in the upper town there is a handsome obelisk, 65 feet high, to the joint memory of the two commanders, Wolfe and Montcalm, who both fell in the 1759 capture of Quebec. Shipbuilding is the chief industry. There are also manufactures of iron-castings, machinery, cutlery, nails, leather, paper, india-rubber goods, rope, tobacco, beetroot-sugar, etc. Quebec is the chief seat of the Canadian trade in timber, immense quantities of



THE CITADEL OF QUEBEC

This imposing and picturesque fortress has played a leading part in the history of Canada since its foundation in the early days of pioneer life. Here, on the Plains of Abraham, Wolfe defeated Montcalm, September 13, 1759.

which are here accumulated, so that at certain seasons rafts moored within booms may be seen extending along the water's edge for 6 miles. The basin of the St. Lawrence, immediately below the town, where it is 2500 yards wide, affords excellent anchorage for ships of large tonnage, while the wharves along the banks of both rivers afford accommodation for the largest vessels. The river is free from ice usually from the 1st of April till the middle of December. Quebec was founded in 1608 by Champlain, who was sent on an exploring expedition from France. In 1629 it came into the hands of the English, but was restored in 1632 to the French, in whose possession it remained till 1759, when it fell into the hands of the British in consequence of Wolfe's famous victory on the Plains of Abraham. The great bulk of the inhabitants (more than five-sixths) are Roman Catholics, chiefly French Canadians, and French continues the common language of the city and province. Pop. (1911) 78,190.

Quebec, a province of the Dominion of Canada, lying mainly between 52° 30′ and 45° N. lat., and between 57° 7′ and 79° 33′ W. lon. It is bounded on the N. by Labrador and the Northeast Territory of Canada; on the E. by Labrador and the Gulf of St. Lawrence; on the S. by the Chaleurs Bay, New Brunswick, and the states of Maine, New Hampshire, Vermont and New York; and on the S. W. by the River Ottawa, which separates it from the province of Ontario. It is nearly 1000 miles in length from E. to W. by 300 in breadth, and has an area of 188,694 square miles. The surface of the country is very varied, being diversified by mountains, rivers, lakes and extensive forests. The chief mountains are the Notre Dame or Shickshock Mountains, extending along the south side of the St. Lawrence, and forming a table-land 1500 feet high, with peaks rising to the height of 4000 feet; and the Laurentian Mountains, or Laurentides, which stretch from the coast of Labrador to the Ottawa River, and rise to a height of from 1200 to 4000 feet. The chief islands are Anticosti, at the mouth of the St. Lawrence, and the Magdalen Islands, in the Gulf of St. Lawrence. The chief river is the St. Lawrence, which flows through the entire length of the province. Next to it in importance is its chief tributary, the Ottawa, over 7000 miles in length. The other largest rivers are the St. Maurice and the Saguenay, this stream and the Ottawa being notable for grand and beautiful scenery. The province boasts many beautiful lakes, the chief being Grand Lake, Temiscamingue, and Lake St. John, from which issues the Saguenay. The climate is variable, though salubrious, the temperature ranging from 20° below zero in winter to 90° above in summer. The soil is generally fertile, and well suited for the growth of cereals, hay, etc.; maize, flax, and tobacco are also grown, especially to the west of the longitude of Quebec, while grapes, melons, peaches, and tomatoes in this region come to maturity in the open air. A large portion of the province is still covered with forest, the white and red pines and the oak being the most valuable trees for timber. The fisheries are extensive and valuable. The minerals worked include apatite, asbestos, gold, copper, iron, plumbago, etc. The manufactures are steadily increasing, and include furniture, leather, paper, chemicals, boots and shoes, woolen goods, steam and agricultural machinery. The chief exports are timber and fish. The educational system embraces institutions of all grades, from primary schools upwards, at the top being three universities — Laval University, Quebec (Roman Catholic); Macgill University, Montreal (Protestant); and Bishop's College, Lennoxville (Anglican). The affairs of the province are administered by a lieutenant-governor (appointed by the governor-general) and an executive council composed of 8 members, assisted by a legislative assembly of 65 members and a legislative council of 24 members. The latter hold their appointments for life; the former are elected by the people for five years. The capital is Quebec, but Montreal is the largest town. Population 2,002,712, of whom 1,429,186 are Roman Catholics, mostly of French descent.

Quebracho (ke-brä′chō), the name given to several trees of different genera, but with similar qualities, indigenous to South America, valuable alike for their wood and their bark. The red quebracho (*Loxopterygium Lorentii*, family Anacardiaceæ) is very hard, but splits easily. The bark and wood are used in tanning. The white quebracho (*Aspidosperma quebracho*) is used for wood-engraving. The bark contains six alkaloids, and is used therapeutically as a remedy for asthma, being employed as a docoction and a tincture.

Quedah (kwē′da), or KEDDAH, a small state on the west coast of the Malay Peninsula, north of Province Wellesley. It is a well-wooded and mountainous country, with numerous rivers, for the most part navigable. The climate is warm but healthy. The chief products are rice, pepper, ivory, and tin.

Pop. 30,000. The capital, of the same name, has a population of 6000.

Quedlinburg (kwed'lin-bur*h*), a town in the Prussian government of Magdeburg, province of Saxony, at the foot of the Harz Mountains, 35 miles s. w. of Magdeburg. On an eminence above the town is an old castle, once the residence of the abbesses of Quedlinburg, who, as princesses of the empire, had a vote in the diet. The manufactures are various, including woolens, beet-root sugar, wine, leather, chemicals, etc. Pop. (1905) 24,798.

Queen (kwēn; Anglo-Saxon, *cwên*, a woman), the wife of a king. In Britain the queen is either *queen-consort*, or merely wife of the reigning king, and is in general (unless where expressly exempted by law) upon the same footing with other subjects, being to all intents the king's subject, and not his equal; or *queen-regent*, regnant, or sovereign, who holds the crown in her own right, and has the same powers, prerogatives, and duties as if she had been a king, and whose husband is a subject; or *queen-dowager*, widow of the king, who enjoys most of the privileges which belonged to her as queen-consort. In Prussia, Sweden, Belgium, and France there can be no queen-regnant. See *Salic Law*.

Queen-bee, the sovereign of a swarm of bees, the only fully-developed and prolific female in the hive, all the other inhabitants being either males (that is drones) or neuters. The queen alone gives birth to new swarms. See *Bee*.

Queen Charlotte Islands, a group of islands in the North Pacific Ocean, off the mainland of British Columbia, north of Vancouver Island, discovered by Cook about 1770, and annexed to the British crown in 1787. The northernmost of the two larger islands is called Graham Island, and the southernmost Moresby Island. The greatest length of the two together is about 160 miles, and the greatest breadth (of the northern island) about 70 miles. All the islands are covered with magnificent forests; gold-bearing quartz of rich quality has been found, and copper and iron ores and a fine vein of anthracite coal also exist. There are numerous creeks suitable for harbors. The climate is excellent. The islands form part of British Columbia.

Queen Charlotte Sound, a channel in the North Pacific Ocean, separating Vancouver Island from the mainland of British America on the north, and forming the commencement of a long series of inlets continued along the north and east of that island.

Queen-of-the-meadows. See *Meadow-sweet*.

Queens' College, Cambridge, was founded in 1448 by Margaret of Anjou, queen of Henry VI, and again in 1465 by Elizabeth, queen of Edward IV. The college buildings are among the most interesting in the university. John Fisher, Thomas Fuller, and Bishop Pearson were members of the college.

Queen's College, Oxford, was founded in 1340 by Robert Eglesfield, chaplain to Philippa, queen of Edward III, and it is from her that it gets its name. The subsequent foundations of John Michel, Sir Francis Bridgman, and Lady Margaret Hungerford were consolidated into one with that of Eglesfield in 1858.

Queen's Colleges, Ireland, colleges three in number, situated respectively at Belfast, Cork, and Galway, and established in 1849 by an act of parliament passed in 1845. They are at present regulated by the charters of 1863. Students of the Queen's Colleges may obtain degrees in arts, medicine, and law from the Royal University of Ireland (which see).

Queen's County, a county of Ireland, in the province of Leinster, with an area of 664 sq. miles. The surface is generally flat, but rises in the northwest into the Slieve-Bloom Mountains, whose highest summit is 1734 feet above sea-level. Iron, copper, and manganese are found, but not worked. Limestone abounds, and in a few places marble is obtained. The soil is generally fertile, although bogs are numerous towards the center of the county. The rivers Barrow and Nore both rise in the Slieve-Bloom Mountains. Agriculture is not generally in an improving state, drainage in particular being much wanted. The principal crops are oats, barley, potatoes, turnips, and mangel-wurzel. Pop. 57,417.

Queensland (kwēnz'land), an Australian colony, comprising the whole northeast portion of Australia north of New South Wales and east of S. Australia and its Northern Territory, being elsewhere bounded by the Gulf of Carpentaria, Torres Strait, and the Pacific. A considerable portion is thus within the tropics, the most northern part forming a sort of peninsula, known as York Peninsula. (See *Australia*.) It has an area of about 668,224 sq. miles, and is divided into twelve large districts, namely, Moreton (East and West),

Darling Downs, Burnett, Port Curtis, Maranoa, Leichhardt, Kennedy, Mitchell, Warrego, Gregory, Burke, and Cook. Most of these districts are now subdivided into counties. Towards the west a large portion of the surface is dry and barren, but towards the east, and for a long stretch along the coast, boundless plains or downs, admirably adapted for sheep-walks, and ranges of hills, generally well wooded and intersected by fertile valleys, form the prevailing features of the country. The coast is skirted by numerous islands, and at some distance is the Great Barrier Reef. The highest mountains are near the coast, the greatest elevation being about 5400 feet. The principal rivers are the Brisbane, the Burnett, the Pioneer, the Fitzroy, and the Burdekin flowing into the Pacific, and the Flinders and Mitchell into the Gulf of Carpentaria. Some of these streams are navigable for a considerable distance inland. The coast is indented with many noble bays, affording some capacious natural harbors, which have already been brought into practical use as the outlets for the produce of the adjacent districts. The climate is healthy, and the temperature comparatively equable. The mean temperature at Brisbane is 69°, the extreme range being from 35° to 106°. In the more northern parts the climate is tropical. The rainfall in the interior is scanty and variable; the mean at Brisbane is about 35 inches. The indigenous animals and plants are similar to those of the rest of Australia. Crocodiles may be mentioned as inhabiting some of the northern rivers. There are many kinds of valuable timber trees, and a rare thing in Australia, a few good indigenous fruits. Sheep-farming is the chief industry, but agriculture (including sugar-growing), cattle rearing, and mining are also important. The soil and climate are well suited for the production of all the ordinary cereals, as well as maize, tobacco, coffee, sugar, cotton, etc. The chief products are sugar, maize, English and sweet potatoes, arrow-root, and semi-tropical fruits. Sugar-growing is becoming a very important industry. Gold, tin, lead, and copper are the principal minerals. The gold-fields extend over an area of 15,000 sq. miles. Coal and plumbago are found in large quantities; and cinnabar, antimony, and manganese are also among the mineral products. The coal-measures cover about 24,000 sq. miles; annual product about 600,000 tons. In the north pearl-fishing is actively carried on. The manufactures are unimportant. The principal manufactories, or works that may be classed as such, are sugar-mills, steam saw-mills, soap-works, agricultural implement works, and distilleries. Education is free and secular in the public schools, and is under a special department controlled by the minister for education. A Queensland university is about to be established. There is no established church, each religious denomination being entirely self-supporting. The principal imports are apparel and haberdashery, cottons and woolens, flour, iron and steel, boots and shoes, tea, spirits, hardware, machinery, wine, etc.; and the principal exports, wool, gold, tin, sugar, preserved meat, cotton, wood, hides and skins. The staple articles of export to the United Kingdom are wool, tallow, and preserved meats. A duty of 5 per cent. is charged on imports of yarns, woven fabrics, paper, stationery, etc.; and duties at other and even higher rates on other articles. The first settlement of Queensland took place in 1825, when the territory was used as a place of transportation for convicts, who continued to be sent there till 1839. In 1842 the country was opened to free settlers. It was originally a part of New South Wales, and was organized as a separate colony in 1859. The government of the colony is vested in a governor, who is the king's representative, and a parliament of two houses, the legislative council and the legislative assembly. The council consists of forty-five members appointed by the crown for life, and the assembly of seventy-two members elected by the people for five years, and representing sixty electoral districts. The capital of the colony is Brisbane. Other noteworthy towns are Cooktown, Gympie, Mackay, Rockhampton, Bundaberg, Warwick, etc. Pop. estimated in 1908, 558,237.

Queen's Metal. See *Britannia Metal.*

Queen's-pigeon, a magnificent ground-pigeon inhabiting the islands of the Indian Ocean, named after Queen Victoria. It is one of two species constituting the genus *Goura* (*G. Victoriæ*), and is the largest and most beautiful species of the order.

Queenstown (kwēnz'town), formerly Cove of Cork, a maritime town of Ireland, and an important naval station, 9 miles southeast of Cork, on the south side of Great Island, which rises abruptly out of Cork harbor to a considerable elevation. The streets rise above one another and present a very picturesque appearance. Queenstown is defended by fortifications on Spike Island and at the entrance of the harbor, which is large and well sheltered. It is the port for the transmission of American mails, and a chief emigration station. It

has little trade and no manufactures, being almost solely dependent on the military and naval establishments in its vicin-

ity, and on the numerous visitors attracted by the singular beauty of the place, and by its delightful climate. Pop. 7909.

Queen's-yellow, the yellow subsulphate of mercury; used as a pigment.

Quelpart (kwel'pärt), a rock-bound island, 60 miles long by 17 broad, off the south coast of Corea, of which it is a penal settlement. The soil is fertile, the climate temperate, and there is a large population. The interior is mountainous, and one summit, the volcanic Mount Auckland, is 6500 feet high.

Quentin, St. (san kaṇ-taṇ), an ancient town of France, dep. of Aisne, on a height above the Somme, 87 miles N.E. of Paris, which from its position on the frontiers between France and the Low Countries figures much in history. It is well built, and has among its edifices a beautiful Gothic church (formerly a cathedral) of the early part of the 13th century, a Gothic town-house, with a façade resting on a colonnade of seven pointed arches, and forming a fine specimen of the flamboyant architecture of the 15th century. The staple manufactures are cotton and woolen goods. The environs are covered with bleachfields. The French were signally defeated here in 1557 by the Spaniards and a body of English auxiliaries, the town being afterwards taken and sacked. In January, 1871, the French were driven out of the town by the Germans after a sanguinary struggle. Pop. 46,578.

Quérard (kā-rär), JOSEPH MARIE, a French bibliographer, born at Rennes in 1791; died at Paris in 1865. He was author of *La France Littéraire*, in which he gives a complete bibliography of France for the 18th and the beginning of the 19th century; *La Littérature Française Contemporaine* 1827-49; and other bibliographical works.

Quercitron (kwer'si-trun), the internal bark of the *Quercus tinctoria*, a species of oak used in manufactures for tanning leather and dyeing yellow.

Quercus. See *Oak*.

Querétaro (kā-rā'tȧ-rō), a city of Mexico, capital of the state of the same name, on a plateau 6365 feet above sea-level, 110 miles northwest of Mexico City. Among the more noteworthy public edifices are the principal church, a magnificent and richly-decorated structure, and an aqueduct about 2 miles long, with arches 90 feet high, which by communicating with a tunnel in the opposite hills, brings a copious supply of water from a distance of 6 miles. Maximilian of Austria, made emperor of Mexico by Napoleon III, was made prisoner and executed here in 1867. Pop. 33,152.— The State of QUERÉTARO has an area of 3207 sq. miles, and forms part of the central plateau of the Cordillera, presenting a very rugged surface, traversed by mountain spurs and lofty heights. Grain and cattle form the chief wealth of the state. The minerals are comparatively unimportant. Pop. 232,389.

Querimba Islands (kā-rēm'bȧ), a chain of low coralline islands extending along the east coast of Africa, and comprised in the Portuguese territory of Mozambique. There is a town and fort on the chief of them, Ibo.

Quern (kwern), a hand-mill for grinding corn, such as is or has been in general use among various primitive peoples. The simplest and most primitive form of the quern is that in which a large stone with a cavity in the upper surface is used to contain the corn, which is pounded rather than ground with a small stone. The most usual form consists of two circular flat stones, the upper one pierced in the center, and revolving on a wooden or metal pin inserted in the lower. In using the quern the grain is dropped with one hand into the central opening, while with the other the upper stone is revolved by means of a stick inserted in a small opening near the edge. Hand-mills of this description are used in parts of Scotland and Ireland to the present day.

Quesnay (kā-nā), FRANÇOIS, a French physician of some eminence, but chiefly noted as a writer on political economy, born in 1694, died in 1774. He was appointed surgeon-in-ordinary to the king, and subsequently, having taken the degree of M.D., physician to Madame de

Pompadour, the mistress of Louis XV, who afterwards got him appointed physician to the king. He was the author of various surgical and medical works; of several articles in the *Encyclopédie*, in which he expounds his economical views; and tracts on politics, including a treatise on the *Physiocratic System* (1768).

Quesnel (kā-nel), Pasquier (Paschasius), a theologian and moralist, born at Paris in 1634; died at Amsterdam in 1719. He became a member of the order of the Fathers of the Oratory in 1657, at that time a great nursery of Jansenism, and wrote a number of devotional works, one of the most important of which was *Réflexions Morales sur le Nouveau Testament*, consisting of thoughts on some of the most beautiful maxims of the evangelists. This work brought him under suspicion of the church on account of its Jansenistic tendencies, and in 1685 he had to quit French territory altogether. Going to Brussels, he there applied himself to the continuation of his work on the New Testament, which was published entire in 1693-94. In this some leading points in Roman Catholicism were freely questioned. Bossuet and Noailles, archbishop of Paris, rather approved of the book; but the Jesuits obtained from Pope Clement XI a bull condemning 101 of Quesnel's propositions as heretical. This bull, known as the Unigenitus (promulgated in 1713), not only stirred up the Jansenists (see *Jansenists*), but awoke bitter dissensions in the bosom of the Gallican Church. Meantime Quesnel had been compelled to seek refuge (1703) in Holland, where he resided for the rest of his life.

Quetelet (kāt-lā), Lambert Adolphe Jacques, a Belgian statistician and astronomer, was born at Ghent in 1796, and studied at the lyceum of his native town, where, in 1814, he became professor of mathematics. In 1819 he was appointed to the same chair in the Brussels Athenæum. In 1828 he became lecturer in the Museum of Science and Literature, holding the post till 1834, when the institution was merged in the newly-established university. Quetelet superintended the erection of the Royal Observatory, and became its first director (1828). A member of the Belgian Royal Academy, he became its perpetual secretary in 1834. Quetelet's writings on statistics and kindred subjects are very numerous. He also published many papers on meteorology, astronomy, terrestrial magnetism, etc. He died in 1874.

Quetta (kwet'tä), a town of Beluchistan, strategically important as being at the entrance to the Bolan Pass, and on the road from Candahar through the Pishin Valley to Shikarpur on the Indus. It thus commands the southern route from India to Afghanistan. By treaty with the Khan of Kelat (1877), in whose territory it is, Quetta was furnished with a British garrison and strongly fortified. It contains extensive magazines of war material, and was in 1885 connected with the Indus by a line of railway. Quetta lies 5500 feet above the sea-level, and is surrounded by mountains from five to six thousand feet high.

Quetzalcoatl (kāt-zal-kō-wat'l), the god of the air of the ancient Mexicans, who presided over commerce and the useful arts, and was said by the Toltecs to have predicted the coming of the Spaniards to Mexico. This tradition aided the Spaniards in their invasion. A beneficent deity, he was finally superseded by the terrible Aztec God of War.

Quevedo y Villegas (ke-vā'dō ē vil-yā'gâs), Don Francisco de, a Spanish poet and prose writer, was born at Madrid in 1580, died in 1645. In consequence of a duel, in which his adversary fell, he fled to Italy, where his services gained him the confidence and friendship of the Duke of Ossuna, viceroy of Naples. After having visited Germany and France Quevedo returned to Spain, and on account of his connection with the duke, then in disgrace, he was arrested and confined to his estate, La Torre de Juan, for three years (1620-23). After his liberation he lived for some years in retirement, occupying himself in writing political satires, burlesque poems, and pamphlets, which obtained an extraordinary degree of success. A second long imprisonment for his satirical writings completely shattered his health, and he died soon after his liberation. His humorous productions are distinguished for playfulness, wit, and invention. His prose works are mostly effusions of humor and satire. His *Visions* ('Sueños') have been translated into most European languages; his *Vida del Gran Tacaño* is a comic romance of the sort called *picaresque*. He also translated the *Enchiridion* of Epictetus into Spanish.

Quezal (kē'zal), a most beautiful Central American bird of the Trogon family (*Trogon* or *Calurus resplendens*). It is about the size of a magpie, and the male is adorned with tail feathers from 3 to 3½ feet in length, and of a gorgeous emerald color. These feathers are not, strictly speaking, the true tail feathers (the color of which is black and

white), but are the upper tail coverts of the bird. The back, head (including the curious rounded and compressed crest), throat, and chest are of the same rich hue, the lower parts being of a brilliant scarlet. The female lacks these long

Quezal (*Trogon resplendens*).

feathers, and is otherwise much plainer. The food of the quezal consists chiefly of fruits. It lives in forests of tall trees. There are several allied species of birds, but none with the distinctive feature of the quezal.

Quezaltenango (kā-säl′tā-nän′gō), a town of Central America, in Guatemala, capital of a department of the same name, with woolen manufactures and a considerable trade. It was founded by Alvarado in 1524. Pop. (1905) about 31,000.

Quibdo (kēb-dō′), a town in the state of Cauca, of the Republic of Colombia, South America, on the Alvalo. Pop. 6856.

Quiberon (kēb-rōṇ), a peninsula on the western coast of France, in the department of Morbihan, containing a market-town of the same name and several hamlets. The place owes its celebrity to the defeat of a small army of Chouans and émigrés which took place here in 1795.

Quibor (kē′bor), a town of Venezuela, in the State of Lara, division Barquisimeto. Pop. 7727.

Quichua (kē′chụ-å), the name of a native race of South America, inhabiting Peru, parts of Ecuador, Bolivia, etc. With the Aymaras the Quichuas composed the larger portion of the population of the empire of the Incas. The Quichua language, which was formerly the state language of the Incas, is still the chief speech of Peru, of a large portion of Bolivia, of the part of Ecuador bordering upon Peru, and of the northern section of the Argentine Republic. It is one of the most beautiful and at the same time comprehensive tongues of America.

Quick Grass, Quitch Grass, or Quickens See *Couch Grass.*

Quick Hedge, Quickset Hedge, an English term for a live hedge of any kind; but in a stricter sense the term is restricted to one planted with hawthorn.

Quicklime. See *Lime.*

Quicksand (kwik′sand), a large mass of loose or moving sand mixed with water formed on many sea-coasts, and at the mouths of rivers, or at marshy inland places, dangerous to vessels or to persons who trust themselves to it and find it unable to support their weight.

Quicksilver. See *Mercury.*

Quietism (kwī′et-izm), a religious movement in the Roman Catholic Church at the close of the 17th and beginning of the 18th centuries, a protest against formality and worldliness, and largely of a mystic character. It owed its origin to such works as the *Spiritual Guide,* published at Rome (1675) by a Spanish priest named Michael Molinos, in which the devout were taught, by resigning themselves to a state of perfect mental inactivity, to bring the soul into direct and immediate union with the Godhead, and receive the infused heavenly light, which was to accompany this state of inactive contemplation. The *Spiritual Guide* produced a number of similar works in Germany and France. The most noted promoter of Quietism in France was the celebrated Madame Guyon (which see), who gained adherents enough to excite the attention of the clergy. Fénelon became the advocate of Madame Guyon and her writings in his *Explication des Maximes des Saints sur la Vie intérieure* (1697). Bossuet obtained (1699) a papal brief which condemned twenty-three positions from Fénelon's book as erroneous; but the humility with which the latter submitted deprived his enemies of the fruits of their victory; and it was the change in the spirit of the times and not violence that gradually buried Quietism in oblivion.

Quilimane (kil-i-mä′ne), a town in East Africa, in the Portuguese territory of Mozambique, unhealth-

ily situated about 15 miles above the mouth of a river of the same name (the northern branch of the Zambesi). It carries on a considerable trade in gold, ivory, wax, etc., and coal of good quality is reported to be plentiful. Pop. about 7000.

Quillai-bark (kwil'lå-i; *Quillaia Saponaria*), the bark of a South American tree belonging to the wing-seeded section of the Rosaceæ. It is used to make a lather instead of soap in washing silks, woolens, etc. It is called also *Quillaya-bark.*

Quiller-Couch, Arthur T., writer, born in England in 1863. Graduating at Oxford, he obtained a position on the staff of *The Speaker*, in which many of his writings have appeared. Among his works are *Ia, a Love Story*, *A Wandering Heath*, and *Adventures in Criticism.*

Quillota (kil-yō'tå), a town in Chile, in the province of Aconcagua, 23 miles northeast of Valparaiso. The copper mines in the vicinity are regarded as the richest in Chile. The town has suffered severely on different occasions from earthquakes. Pop. 9876.

Quills (kwilz), the large wing-feathers of birds, and in a narrower sense the shafts or barrels of these. Quills are still in some localities used for making pens, although they have been generally superseded by steel and other metals for this purpose. The best quills for pens are those of the swan, but goose-quills are commonly used. Crow-quills are used for fine writing and pen-and-ink drawing. (See *Pen.*) Quills are also used for making brushes, artificial flowers, imitative horse-hair work, and a number of other articles, and the feather ends have even been woven into fine tissues.

Quiloa (kēl'o-å), or Kilwa, a seaport of East Africa on the Zanzibar coast. Pop. 6000.

Quilon (kwē-lōn'), a coast town in Madras, India, in the state of Travancore, 35 miles northwest of Trivandrum, the capital, with a considerable export trade. It has a barrack for European troops, a hospital, and an Episcopal church. Pop. 15,691.

Quilting (kwilt'ing), a method of sewing two pieces of silk, linen, or stuff on each other, with wool or cotton between them, by working them all over in the form of checker or diamond work, or in flowers.

Quimper (kaṇ-pār), a town and port in France, capital of the department of Finistère, 4 miles southeast of Brest, at the head of the estuary of the Odet, an old town partly surrounded with walls flanked by towers. The principal edifices are a fine Gothic cathedral (1239-1493); the ruins of a Cordelier church and cloister; the college, the prefecture, military hospital, etc. The manufactures are earthenware, leather, cordage, etc. The sardine fishery forms an important occupation. Pop. (1906) 16,559.

Quimperlé (kaṇ-pār-lā), a town of France, dep. Finistère, beautifully situated among hills at the confluence of the Isole and Ellé. Pop. 6093.

Quin (kwin), James, an eminent actor, of Irish parentage, born at London in 1693; died at Bath in 1766. He made his first appearance on the stage at Dublin in 1714; shortly afterwards he obtained an engagement in London, and gradually acquired celebrity as a tragic actor as well as in characters of comic and sarcastic humor, like *Falstaff*, *Volpone*, etc. He retained his preëminence until the appearance of Garrick in 1741. His last performance was *Falstaff* (1753), in which character he is supposed never to have been excelled. He spent his latter years at Bath, where his fund of anecdote and pointed wit made him much sought after.

Quince (kwins), the fruit of the *Cydonia vulgāris*, nat. order Rosaceæ. The quince tree, which is supposed to be a native of Western Asia, is now cultivated throughout Europe, and in many parts of the United States, for its handsome golden yellow fruit, which, though hard and austere when plucked

Quince (*Cydonia vulgāris*).

from the tree, becomes excellent when boiled and eaten with sugar, or preserved in sirup, or made into marmalade.

Quincey, Thomas de. See *De Quincey.*

Quincunx (kwin'kungks), an arrangement of five objects, especially trees, in a square, one at each corner of the square and one in the middle.

Quincy (kwin'si), the name of two cities and several villages in the United States. (1) A city, capital of Adams county, Illinois, on the left bank of the Mississippi, 160 miles northwest of St. Louis. It is an important railway center; has an extensive river traffic, and various manufacturing establishments, including extensive beer works, also sash, blind, stove, furniture, and various other factories. A railroad bridge crosses the river at this point. Pop. 36,587. (2) A city of Norfolk Co., Massachusetts, on Quincy Bay, about 8 miles south from Boston. Its most important and lucrative industry is the working of the quarries, which furnish the well-known Quincy granite. The fisheries also are important, and a considerable number of vessels are fitted out in the building yards. Here John Adams, and his son, John Quincy Adams, both Presidents of the United States, were born. Pop. 32,642.

Quincy, Josiah, an American writer, born at Boston in 1772; died in 1864. Educated for the law, he made politics his profession, and was a member of Congress from 1804 to 1812. Then he was elected a member of the senate of the legislature of Massachusetts, a position which he held till 1821, in which year he held the office of Speaker of the House. From 1823 to 1828 he was mayor of Boston and effected various important reforms. From 1829 to 1845 he was president of Harvard College. His principal works are *History of Harvard Univcrsity; Municipal History of the Town and City of Boston During Two Centuries;* and *Life of John Quiney Adams.*

Quinet (kē-nā), Edgar, a French philosopher, poet, historian, and politician, born in 1803; died in 1875. He first attracted attention by a translation of Herder's *Philosophie der Geschichte* in 1825. In 1828 he accompanied a scientific commission to the Morea; and in 1839 he became professor of foreign literature at Lyons, a position he changed in 1841 for a similar chair in the College of France. In consequence of the strongly democratic tone of the lectures delivered there from 1843 to 1846 his class-room was in the latter year closed by the government, and was not reopened till after the revolution of 1848. After the election of Napoleon as president Quinet was expelled from France, and refusing all Napoleon's amnesties, his exile lasted till after the revolution of 1870. His works, which number about thirty volumes, include poems, dramas, histories, religious mystical books, etc.

Quinine (kwin'ēn, kwī'nīn; $C_{20}H_{24}N_2O_2$), a white, crystalline alkaloid substance, inodorous, very bitter, and possessed of marked antifebrile properties. It is obtained from the bark of several trees of the order Cinchonaceæ (see *Cinchona*), but perhaps the best is that from calisaya bark. It was discovered about 1820, and has entirely superseded the use of the bark itself in medicine, being most commonly used in the form of sulphate of quinine. The extraordinary value of quinine in medicine as a febrifuge and tonic has given rise to a large trade in Peruvian bark, and has caused the cinchona tree to be extensively planted in India and elsewhere. Quinine in small doses is stomachic, in large doses it causes extreme disturbance of the nerves, headache, deafness, blindness, paralysis, but seldom death.

Quinoa (kwi-nō'a), a South American plant (*Chenopodium Quinoa*), of which there are two cultivated varieties, one yielding white seeds, and sometimes called petty-rice, the other red. The white seeds are extensively used in Chile and Peru as an article of food in the form of porridge, cakes, etc. The seeds of the other variety, *red quinoa*, are used medicinally as an application for sores and bruises.

Quinquagesima (kwin-kwa-jes'i-ma), name of the Sunday before Lent, because fifty days before Easter.

Quinsy (kwin'zi), the common name for *eynanchē tonsillaris* or *tonsillitis*, inflammation of the tonsils. The inflammation is generally ushered in by a feeling of uneasiness in the part. The voice is thick, and there is often swelling of the glands of the neck, with loss of appetite, thirst, headache, and a considerable degree of general fever. The tonsils, uvula, and even the soft palate are swollen and vascular, and the tongue is foul and furred. In severe cases respiration is considerably impeded, and swallowing is always difficult and painful. The inflammation of the throat may terminate either in resolution or suppuration. The most frequent cause of quinsy is cold, produced by sudden changes of temperature. But in a great many cases it will be found that the patient has been predisposed to the disease. owing to a bad state of the digestive organs. The best treatment to ward off an attack is to administer a dose of some strong purgative saline medicine. Bland soothing drinks should be given during the course of the disease, and sucking small pieces of ice usually gives much relief.

Quintain (kwin'tan), a figure or other object formerly set up to be tilted at with a lance. It was constructed in various ways; a common form in England consisted of an upright post, on the top of which was a horizontal bar turning on a pivot; to one end of this a

Ancient Quintain at Offham, Kent.

sand-bag was attached, on the other a broad board; and it was a trial of skill to tilt at the broad end with a lance, and pass on before the bag of sand could whirl round and strike the tilter on the back.

Quintal (kwin'tal), a weight of 100 lbs. or thereby, used in different countries. The old French quintal was equal to 100 livres, or nearly 108 lbs. avoirdupois. The *quintal métrique*, or modern quintal, is 100 kilogrammes, or 220 lbs. avoirdupois.

Quintana (kin-tä'nȧ), Manuel José, a Spanish poet, born at Madrid in 1772; died in 1857. He studied at Cordova and Salamanca, became an advocate, and filled various offices connected with the government at different times. Almost all the manifestoes in the war against the French were composed by him; he also wrote a series of patriotic poems, entitled *Odas a España Libre*. He was eventually appointed director-general of education, and became a senator. His poetical, critical and historical works are held in high estimation.

Quintet (kwin-tet'; Italian, *quintetto*), a vocal or instrumental composition in five parts, in which each part is obligato, and performed by a single voice or instrument.

Quintilian (kwin-til'yan), Marcus Fabius Quintilianus, a Roman rhetorician, born at Calagurris (Calahorra) in Spain, probably between 35 and 40 A.D.; died about 118. He began to practice as an advocate at Rome about A.D. 69, and subsequently became a teacher of rhetoric. Some of the most eminent Romans were his pupils, and the Emperor Domitian bestowed on him the consular dignity. His work, *De Institutione Oratoria*, contains a system of rhetoric in twelve books, and includes some important opinions of Greek and Roman authors.

Quintus Cal'aber, or Smyrnæ'us, a Greek poet, author of a sort of continuation of the *Iliad* in fourteen books, a rather dull imitation of Homer. He probably flourished at Smyrna in the 4th century A.D.

Quintus Curtius. See *Curtius*.

Quipo, Quipu (kwip'o, kwip'ö), a cord about 2 feet in length, tightly spun from variously colored threads, and to which a number of smaller threads were attached in the form of a fringe: used among the ancient Peruvians and Mexicans for recording events, etc. The fringe-like threads were also of different colors. and were knotted. The colors denoted sensible objects, as white for silver, yellow for gold, and the like; and sometimes also abstract ideas, as white for peace, red for war. They constituted a rude register of certain important facts or events, as of births, deaths, and marriages, the number of the population fit to bear arms, the quantity of stores in the government magazines, etc.

Quire (kwīr; French, *cahier*), twenty-four sheets of paper. Twenty quires make a *ream*.

Quirinal (kwir'i-nal), one of the seven hills of ancient Rome. There is a palace here, begun in 1574, and formerly a summer residence of the popes, but since 1871 the residence of the king of Italy. See *Rome*.

Quirinus (kwi-rī'nus), among the Romans, a surname of Romulus after he had been raised to the rank of a divinity. Hence *Quirinalia*, a festival in honor of Romulus, held annually on the 13th day before the Kalends of March, that is, the 17th of February.

Quirites (kwi-rī'tēz), a designation of the citizens of ancient Rome as in their civil capacity. The name of Quirites belonged to them in addition to that of Romani, the latter designation applying to them in their political and military capacity.

Quirk Molding, or Quirked Molding, in architec-

ture, a molding whose sharp and sudden return from its extreme projection to the re-entrant angle seems rather to partake of a straight line on the profile than of the curve.

Quit-claim, in law, signifies a release of any action that one person has against another. It signifies also a quitting of a claim or title to lands, etc.

Quito (kē'tō), the capital of Ecuador, in a ravine on the east side of the volcano of Pichincha, 9348 feet above the sea, a little to the south of the equator. Its streets, with exception of four which meet in the large central square, are narrow, uneven, badly paved, and extremely dirty. The more important public buildings are the cathedral, several other churches and convents; the town-house, court-house, president's palace, the university, the episcopal palace, orphan asylum, and hospital. The manufactures consist chiefly of woolen and cotton goods. From the want of good roads and railways trade is much hampered. Quito was originally the capital of a native kingdom of the same name, but the modern town was founded by the Spaniards in 1534. It has repeatedly suffered from earthquakes. Pop. (1906) 50,840, largely consisting of half-breeds and Indians.

Quit-rent, in English law, a small rent generally payable by the tenants of manors, whereby the tenant goes quit and free from all other services. Quit-rents still existing are redeemable by law.

Quittah (kwit'ta), a town on the coast of W. Africa, in the British colony of the Gold Coast. Pop. 5000.

Quoin (koin), in artillery, a wedge inserted under the breach of a gun, for raising or depressing the muzzle. In architecture, one of the stones forming the solid corner of a building.

Quoits (kwoitz), a game played with a flattish ring of iron, generally from $8\frac{1}{4}$ to $9\frac{1}{2}$ inches in external diameter, and between 1 and 2 inches in breadth. It is convex on the upper side and slightly concave on the under side, so that the outer edge curves downwards, and is sharp enough to cut into soft ground. The game is played in the following manner: — Two pins, called hobs, are driven into the ground from 18 to 24 yards apart; and the players, who are divided into two sides, stand beside one hob, and in regular succession throw their quoits (of which each player has two) as near the other hob as they can, giving the quoit an upward and forward pitch with the hand and arm, and at same time communicating to it a whirling motion so as to make it cut into the ground. The side which has the quoit nearest the hob counts a point towards game, if the quoit rests on the hob it counts two, if thrown so as to 'ring' the hob, it counts three.

Quorra (kwor'ra), a name given to the lower portion of the Niger (which see).

Quorum (kwō'rum), a term used in commissions, of which the origin is the Latin expression, *quorum unum A. B. esse volumus* ('of whom we will that A. B. be one'), signifying originally certain individuals, without whom the others could not proceed in the business. In legislative and similar assemblies a quorum is such a number of members as is competent to transact business.

Quotidian Fever. See *Ague.*

Quo Warranto, the name of a writ summoning a person or corporation to show by what right a particular franchise or office is claimed. In the rights of Charles II and James II this writ was used oppressively to deprive cities and boroughs of their liberties.

R

R is the eighteenth letter of the English alphabet, classed as a liquid and semi-vowel. In the pronunciation of Englishmen generally it represents two somewhat different sounds. The one is heard at the beginning of words and syllables, and when it is preceded by a consonant; the other, less decidedly consonantal, is heard at the end of words and syllables, and when it is followed by a consonant. In the pronunciation of many English speakers, *r*, followed by a consonant at the end of a syllable, is scarcely heard as a separate sound, having merely the effect of lengthening the preceding vowel; when it is itself final, as in *bear*, *door*, *their*, etc., it becomes a vowel rather than a consonant.—*The three Rs*, a humorous and familiar designation for *Reading*, *Writing*, and *Arithmetic*. It originated with Sir William Curtis, who, on being asked to give a toast said, 'I will give you *the three Rs*, *Riting*, *Reading*, and *Rithmetic*.'

Ra (more properly RÊ), the name of the god of the sun among the ancient Egyptians. He is represented, like Horus, with the head of a hawk, and bearing the disk of the sun on his head. *Tum*, *Harmachis*, and other gods are mere impersonations of the various attributes of Ra.

Raab (räb), or GYÖR (dy*eur*), a town in Hungary, at the confluence of the Raab and Rabnitz with the Danube, 67 miles W.N.W. of Buda. It is the see of a Roman Catholic bishop, and has a fine cathedral, an episcopal palace, diocesan seminary, etc. Its manufactures are woolen cloth, cutlery, and tobacco. Pop. 27,738.

Rabat (rä-bät'), a maritime town in Morocco, in the province of Fez, on the Atlantic, at the mouth of the Buregreb, is surrounded with a wall flanked by numerous towers, and has a citadel and batteries. It has some manufactures (carpets, woolens, cottons, and leather) and considerable trade in wool and corn. Pop. about 35,000. On the other side of the river mouth is the town of Sallee.

Rabba (råb'bå), a town of the Western Soudan, in the Kingdom of Gando, on the left bank of the Niger, some 350 miles from its mouth, formerly populous and with a considerable trade in slaves and ivory, and manufactures of woolen.

Rabbet (rab'et), in carpentry, a sloping cut made on the edge of a board so that it may join by lapping with another board similarly cut; also, a rectangular recess, channel, or groove cut along the edge of a board or the like to receive a corresponding projection cut on the edge of another board, etc., required to fit into it.

Rabbi (rab'i), a title of honor among the Hebrews, corresponding nearly to the English *master*. There are two other forms of the title, *rabboni* and *rabbani*, the former of which is found in the New Testament. It is supposed that this title first came into use at the period immediately preceding the birth of Christ. In the time of our Lord it was applied generally to all religious teachers, and hence sometimes to Christ himself. Now the term rabbi or rabbin is applied to regularly appointed teachers of Talmudic Judaism.

Rabbinic Hebrew (ra-bin'ik), that form of Hebrew in which the Jewish scholars and theologians of the middle ages composed their works. Grammatically it differs but little from the ancient Hebrew, but in many cases new meanings are attached to Hebrew words already in use, in other cases new derivatives are formed from old Hebrew roots, and many words are borrowed from the Arabic. The rabbinical literature is rich and well repays study.

Rabbit (rab'it; *Lepus cunicŭlus*), a genus of rodent mammals, included in the family Leporidæ, to which also belong the hares. It is of smaller size than the hare, and has shorter ears and hind legs. The rabbit's fur in its native state is of a nearly uniform brown color, while under domestication the color may become pure white, pure black,

piebald, gray, and other hues. The texture of the fur also changes under domestication. The rabbit is a native of all temperate climates, and in its wild state congregates in 'warrens' in sandy pastures and on hill-slopes. Rabbits breed six or seven times a year, beginning at the age of six months, and producing from five to seven or eight at a birth. They are so prolific that they may easily become a pest, as in Australia, if not kept in check by beasts and birds of prey. They feed on tender grass and herbage, and sometimes do great damage to young trees by stripping them of their bark. They grow exceedingly tame under domestication, and sometimes exhibit considerable intelligence. Rabbits are subject to certain diseases, such as rot — induced probably by damp and wet — parasitic worms, and a kind of madness. The skin of the rabbit is of considerable value; cleared of hair, it is used with other skins to make glue and size. The fur is employed in the manufacture of hats, and to imitate other and more valuable furs, as ermine, etc.

Rabelais (rȧb-lā), FRANÇOIS, a humorous and satirical French writer, born in or before 1495, the son of an apothecary of Chinon, in Touraine. He entered the Franciscan order at Fontenay-le-Comte, in Poitou, and received the priesthood. His addiction to profane studies appears to have given offense to his monastic brethren, and through the influence of friends he obtained the permission of Clement VII to enter the Benedictine order (about 1524). He then exchanged the seclusion of the monastery for the comparative freedom of the residence of the Bishop of Maillezais, who made him his secretary and companion. In the course of a few years we find him at Montpellier, where he studied medicine, having by this time become a secular priest; he was admitted a bachelor in 1530, and for some time successfully practiced and taught. In 1532 he went to Lyons, where he published a work of Hippocrates and one of Galen, and the first germ of his *Gargantua* (1532 or 1533). The first part of his *Pantagruel* appeared under the anagram of *Alcofribas Nasier*, within a year or so after the former work, and its success was such that it passed through three editions in one year. Soon after its publication Rabelais accompanied Jean du Bellay on an embassy to Rome. On his return to France he went first to Paris; but not long after he is found once more at Lyons, where the *Gargantua*, as we now have it, first saw the light (1535). The *Gargantua* and *Pantagruel* together form a single work professing to narrate the sayings and doings of the giant Gargantua and his son Pantagruel. In 1536 Rabelais was again at Rome, and on this occasion he obtained from the pope absolution for the violation of his monastic vows, and permission to practice medicine and to hold benefices. Shortly afterwards he was granted a prebend in the abbey of Saint Maur-des-Fossés by Jean du Bellay. In 1537 he took his degree of Doctor of Medicine at Montpellier, and lectured on Hippocrates. The next few years were as unsettled as regards his abode as any previous period of Rabelais' life, and it is difficult to follow him. Probably he was in Paris in 1546, when the third book of his *Gargantua and Pantagruel* appeared, but during most of 1546 and part of 1547 he was physician to the town of Metz. In the third book all the great moral and social questions of the day were discussed with the gayety and irony peculiar to Rabelais, and with a freedom that roused the suspicion of the clergy, who endeavored to have it suppressed. The favor of the king secured its publication, but it was with more difficulty that a license was obtained for the fourth book from Henry II, who had succeeded Francis in 1547. This book did not appear complete till 1552. About 1550 Rabelais was appointed to the cure of Meudon, but he resigned the position in 1552, and died a year later, according to most authorities. He left the whole of the fifth book of his remarkable romance in manuscript. By many Rabelais has been set down as a gross buffoon, and there is much in his writings to justify the harsh judgment, though we must remember what was the taste of his times. As regards the purpose of his work, many have looked upon Rabelais as a serious reformer of abuses, religious, moral, and social, assuming an extravagant masquerade for the purpose of protecting himself from the possible consequences of his assaults on established institutions. The earlier books were translated into English by Sir Thomas Urquhart (1653), who found a continuator in Motteux. There are also translations into German and Italian.

Rabies (rā'bi-ēz), the name given to a contagious disease with which dogs, horses, cats, wolves, and other animals are attacked, and to which, indeed, all animals are said to be liable. A bite from some rabid animals induces hydrophobia in man. See *Hydrophobia*.

Racalmuto (rä-kȧl-mö'tō), a town of Sicily, in the prov-

ince of Girgenti, with mines of sulphur, salt, and quicksilver. Pop. 15,938.

Raccahout (rak'ka-höt), a starch or meal prepared from the edible acorn of the Barbary oak (*Quereus Ballōta*), sometimes recommended as food for invalids. Mixed with sugar and aromatics it is used by the Arabs of Northern Africa as a substitute for chocolate.

Raccoon'. See *Raeoon.*

Race-horse, a horse bred or kept for racing or running in contest, called also a *Blood-horse* and a *Thorough-bred Horse.* Racing has long been practiced in Europe, with the result of greatly developing the speed of the horse. Trotting has long been the favorite pace in the United States, as running is in England, and the American race-horse, though inferior to the Arab in point of endurance, is the finest horse in the world as regards speed in trotting for a moderate distance. It has of late years also shown fine powers in running. It is of Arabian, Berber, or Turkish extraction, improved and perfected by the influence of the climate, and by careful crossing.

Raceme (ra'sēm), in botany, a form of inflorescence in which the primary axis is elongated, and bears flowers placed on pedicles of nearly equal length, as in the currant and lily-of-the-valley. The inflorescence is centripetal or indefinite. It differs from a spike only in the flowers not being sessile. See *Infloreseenee.*

Rachel (rà-shell), Mademoiselle (Elizabeth Rachel Felix), a French *tragédienne,* of Jewish extraction, born in 1821; died in 1858. For a time she gained her living by singing in the streets of Lyons, but being taken notice of she was enabled to receive a course of instruction at the Conservatoire, and made her *début* in 1837 on the stage of the Gymnase at Paris. She attracted no special attention, however, until the following year, when, transferred to the Théâtre Français, she took the Parisian public by storm by the admirable manner in which she impersonated the classic creations of Racine and Corneille. Her reputation was speedily established as the first tragic actress of her day. In 1841 she visited England, and was received with the greatest enthusiasm. Her renown continued to increase, and for many years she reigned supreme at the Théâtre Français, making also tours to the provincial towns of France, to Belgium, etc. Later she visited America, but when there caught a severe cold, which terminated in consumption. She was of a fierce and unlovable temper, destitute of moral principle, and very avaricious.

Rachis (rā'kis), in botany, a branch which proceeds nearly in a straight line from the base to the apex of the inflorescence of a plant. The term is also applied to the stalk of the frond in ferns, and to the common stalk bearing the alternate spikelets in some grasses.

Rachitis (ra-kī'tis), a term which properly implies inflammation of the spine, but it is applied to the disease called *Riekets,* which term suggested this as the scientific name.

Racine (ra-sēn'), a city of Wisconsin, capital of Racine Co., on the W. shore of Lake Michigan, 23 miles S. by E. of Milwaukee. It has one of the best harbors on the lake and a large lumber and coal trade. Its manufactures are important, including large threshing-machine works, iron foundries, machine shops, tanneries, woolen and flour mills, and numerous other manufactures. Pop. 38,002.

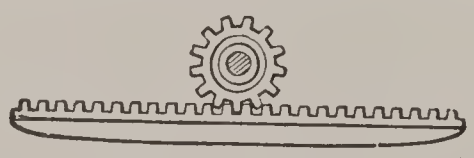
Racine (rå-sēn), Jean Baptiste, a distinguished French dramatist, born at La Ferté-Milon (Aisne) in 1639; died at Paris in 1699. He was educated at Port-Royal, the famous Jansenist institution, and at the Collége d'Harcourt. After writing an ode, called *Nymphes de la Seine,* in honor of the king's marriage, and two comedies, now lost, he made the acquaintance of Boileau and Molière, and began to write for the stage. His first tragedy, the *Thébaïde,* or *Les Frères Ennemis,* was performed by Molière's troupe at the Palais-Royal in 1664, as was also his next, *Alexandre,* in 1665. His first masterpiece was *Andromaque,* which on its performance at the Hôtel de Bourgogne, in 1667, produced a profound impression. The immediate successor of *Andromaque* was *Les Plaideurs* (1668), a witty and delightful imitation of the *Wasps* of Aristophanes. His succeeding pieces were *Britannieus* (1669); *Bérénieе* (1670); *Bajazet* (1672); *Mithridate* (1673); *Iphigénie* (1674); *Phèdre* (1677), the last piece that Racine produced expressly for the theater. In 1673 he obtained a seat in the French Academy. His withdrawal from the theater in 1677 was partly due to chagrin at the success of a hostile party of theatrical critics who applauded a writer now never heard of at the expense of Racine. At this period his friends persuaded him to marry, and soon after (1678) he was appointed, along with Boileau, historiographer to the king, whom he accompanied in his campaign to Flanders. After a silence of twelve years

Racine, at the solicitation of Madame de Maintenon, wrote two other pieces — *Esther* (1689) and *Athalie* (1691). His death is said to have been hastened by grief at losing the favor of the king. As a dramatist Racine is usually considered the model of the French classical tragic drama, and in estimating his powers in this field it is necessary to take into account the stiff conventional restraints to which that drama is subjected. What he achieved within these limits is extraordinary. Besides his dramas Racine is the author of epigrams, odes, hymns, etc.

Racing (ras'ing). See *Horse-racing.*

Rack (rak), an instrument for the judicial torture of criminals and suspected persons. It was a large open wooden frame within which the prisoner was laid on his back upon the floor, with his wrists and ankles attached by cords to two rollers at the end of the frame. These rollers were moved in opposite directions by levers till the body rose to a level with the frame; questions were then put, and if the answers were not deemed satisfactory the sufferer was gradually stretched till the bones started from their sockets. It was formerly much used by civil authorities in the cases of traitors and conspirators; and by the members of the Inquisition, for extorting a recantation from imputed heretical opinions. The rack was introduced into England in the reign of Henry VI, and although declared by competent judges to be contrary to English law, there are many instances of its use as late as the time of Charles I.

Rack, in machinery, a straight or slightly curved metallic bar, with teeth on one of its edges, adapted to work into the teeth of a wheel or pinion,



Rack and Pinion.

for the purpose of converting a circular into a rectilinear motion, or vice versa.

Rackets, or Racquets (rak'ets), a game played in a prepared court, open or close, with a small hard ball and a bat like that used for playing tennis. The close or roofed court is now generally preferred for playing in. It is an oblong rectangular area, 80 feet long and 40 broad when of full dimensions, and having high walls. The floor is divided into two chief areas of unequal size by a line, called the *short line*, drawn across it at two-fifths of the length of the court from the back wall, the smaller area being again divided into two equal parts by a line at right angles to this, and two small areas being marked off in the other space next the short line, called *service spaces.* Two horizontal lines are also drawn across the front wall, one 2 feet 2 inches above the floor, below which if a ball strike it is out of play, the other, the *cut line*, 7 feet 9 inches above the floor. The game may be played with either one or two persons on each side. It is decided by lot which side goes in first, and the first player assumes which side of the court he pleases (usually the right), while the other stands in the opposite corner. The first player then begins to *serve*, which consists in striking the ball with the bat so as to make it strike the front wall above the cut line, and then rebound into the opposite corner. If the ball is properly served the second player must strike it before it has made a second bound, so that it strikes the front wall above the lower line; but in returning the ball in this manner the player may if he likes first make it strike either of the side walls. The player may also return it before it touches the floor. The first player then returns the ball in the same way, and this goes on until either player fails. If it is the first player who fails, it is then the turn of the second player to serve. If it is the second player, the first scores one (an ace), and continues to serve, but goes to the opposite side of the court. In general fifteen is game.

Racoon, or Raccoon (ra-kön'), an American plantigrade carnivorous mammal, the common raccoon being the *Procyon lotor.* It is about the size of a small fox, and its grayish-brown fur is deemed valuable, being principally used in the manufacture of hats. This animal lodges in hollow trees, feeds occasionally on vegetables, and its flesh is

Common Raccoon (*Procyon lotor*).

palatable food. It inhabits North America from Canada to the tropics. The black-footed raccoon of Texas and California is *P. Hermandezii.* The agouara or crab-eating raccoon (*P. cancrivŏrus*) is found further south on the American continent than the above species, and is

generally larger. Although denominated 'crab-eating' it does not appear to be any more addicted to this dietary than the common species.

Radautz (rä'douts), a town of Austria, in the duchy of Bukowina, with a government stud of horses and manufactures of machinery, glass, paper, beer, and spirits. Pop. 14,403.

Radcliffe (rad'klif), a town in Lancashire, on the river Irwell, 7 miles N. W. of Manchester and 3 S. W. of Bury; does a considerable business in calico-printing, cotton-weaving, bleaching, etc., and has extensive collieries in its vicinity. Pop. (1911) 26,085.

Radcliffe, ANN WARD, novelist, was born in London in 1764; died in 1823. She married at the age of twenty-three Mr. William Radcliffe, afterwards editor and proprietor of the *English Chronicle* newspaper. She published in quick succession *The Castles of Athlin and Dunbayne,* a Highland story; *The Sicilian Romance;* and *The Romance of the Forest.* Her masterpiece is considered to be the *Mysteries of Udolpho* (1794), which was long very popular. The last of her novels published during her life was *The Italian* (1797). A posthumous romance, *Gaston de Blondeville,* was edited by T. N. Talfourd in 1826, together with some poetical pieces. Mrs. Radcliffe had considerable power in description, and knew how to arouse the curiosity of her readers; but her characters are insipid, and the conclusion of her stories lame and impotent.

Radcliffe, JOHN, a celebrated medical practitioner, born in 1650 at Wakefield, in Yorkshire, and educated at Oxford. Having studied medicine, and taken the degree of M.B., he became in 1686 physician to the Princess Anne of Denmark, and was frequently consulted by King William. He attended Queen Mary in 1694 when she was attacked by small-pox, but was unable to save her. Rough and blunt in manner, he lost the good graces of Anne, and also of William, by his plain speaking. In 1714, when the queen was seized with her last illness, he was sent for, but either could not or would not attend. This gave rise to great ill-feeling towards him. He died in 1714, leaving £40,000 to the University of Oxford for the foundation of a library of medical and philosophical works. See next article.

Radcliffe College. See *Harvard University.*

Radcliffe Library, a library founded in connection with Oxford University out of funds destined for the purpose by Dr. John Radcliffe, and opened in 1749. The building erected by the Radcliffe trustees for the reception of the books forming the library is now used as a reading-room in connection with the Bodleian Library. An observatory in connection with the university was founded in 1772 by the Radcliffe trustees.

Radeberg (rä'dė-berh), a town in Saxony, 9 miles N. E. of Dresden, on the Roeder; has important manufactures of glass, paper, etc. Pop. (1905) 13,301

Radetzky (r a - d e t's k ē), JOSEPH WENCESLAUS, COUNT, a famous Austrian soldier, born at Trebnitz, in Bohemia, in 1766; died in 1858. Commencing his career in a Hungarian regiment of horse in 1784, he fought in most of the campaigns in which Austria was engaged from that date up to the time of his death, including Hohenlinden, Wagram, and Leipzig. But his most signal services were in Italy, whither he was called by the commotions following the French revolution of 1830, and where a great part of his subsequent life was spent. On the breaking out of the insurrection at Milan in March, 1848, Radetzky maintained a fight for several days in the streets, and then retreated with his forces to Verona. On the Sardinian king Charles Albert taking the field he assumed the offensive, and after an arduous, and for a time doubtful, campaign gained the victory of Custozza (July 25), which compelled Charles Albert to retreat to Milan, and then evacuate the city after a short contest, thus preserving Lombardy to Austria. An armistice having been concluded with Sardinia he next occupied himself with the blockade of the revolted city of Venice, but hurried from it in March, 1849, on the resumption of hostilities with Charles Albert. Assembling his army at Pavia he crossed the Ticino, and gained so decisive a victory at Novara, on March 23, that the king abdicated in favor of his son, Victor Emmanuel, and a treaty was concluded which secured for the time the Austrian supremacy in Italy. Venice surrendered to Radetzky in August of the same year. Radetzky had been made field-marshal in 1836, and other honors and rewards were now showered upon him. The remainder of his life was spent at Milan.

Radhanpur (räd'hun-pör), a petty state of British India, in the N. W. of Gujerat, with an area of 1150 square miles. The state came under British protection in 1819. Pop. 61,548.—The capital of the state has the same name. Pop. 11,879.

Radiata (rā-di-ā′ta), the name given by Cuvier to the fourth great division of the animal kingdom, including those animals whose parts are arranged round an axis, and display more or less of the 'rayed' appearance or conformation. In modern zoology Cuvier's division has been abolished, and the radiata have been divided into the Protozoa, Cœlenterata, and Annuloida or Echinozoa.

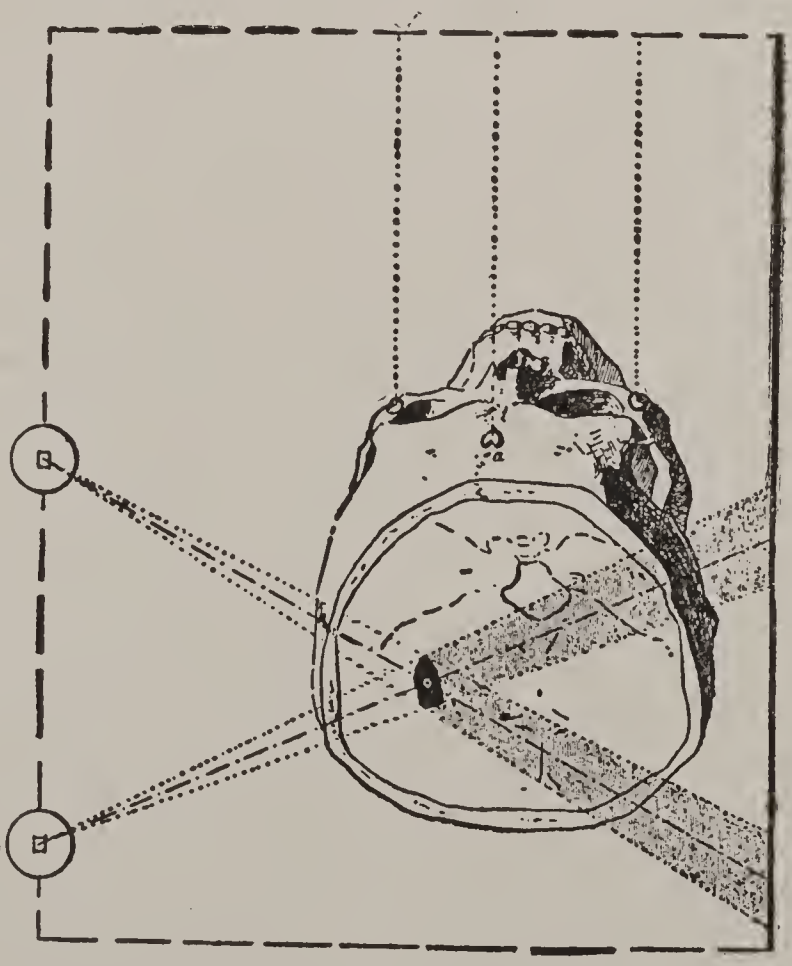
Radiation. See *Heat.*

Radical (rad′i-kal; from *L. radix*, root), the name adopted by a large section of the Liberal party in Britain, which desires to have all abuses in the government completely rooted out, and a larger portion of the democratic spirit infused into the constitution. The term was first applied as a party name in 1818 to Henry Hunt, Major Cartwright, and others, who wished to introduce radical reform in the representative system.

Radicles, or RADICALS (rad′i-klz), a name given in chemistry to certain groups of elements which remain united throughout many reactions. See *Chemistry.*

Radio-activity (rā′di-ō), the power possessed by certain substances of giving off electrons and other corpuscles at high velocity. Of the substances which possess this power radium is the most active. This power is of recent discovery and is being actively investigated. Some physicists believe that it is possessed in a measure by all substances, though this has not been demonstrated.

Radiograph (-graf), a picture of an object or objects obtained by means of the Roentgen rays instead of light rays; called also skiagraph.



Locating a Bullet in the Head by the use of Radiography.

Radiolaria (-lâr′i-a), an order of Protozoa of the class Rhizopoda, characterized by possessing a central mass of sarcode inclosed in a porous, membranous, or chitinous capsule which is surrounded by a sarcode envelope. They often possess a siliceous or flinty test or siliceous spicules, and are provided with *pseudopodia*, or prolongations of their soft protoplasmic bodies, which stand out like radiating filaments, and occasionally run into one another. The Polycystina (which see) belong to the Radiolaria.

Radish.

Radiometer (rā-di-om′e-tėr), an instrument designed for measuring the mechanical effect of radiant energy. It consists of four crossed arms of very fine glass, supported in the center by a needle-point having at the extreme end thin disks of pith, blackened on one side. The instrument is placed in a glass vessel exhausted of air, and when exposed to rays of light or heat the wheel moves more or less rapidly in proportion to the strength or weakness of the rays.

Radish (rad′-ish; *Raphănus satīvus;* natural order, Cruciferæ), a well-known cruciferous plant, unknown in a wild state, but cultivated for a number of centuries in Europe, and for many years in America. The tender leaves

are used as a salad in early spring, the green pods are used as a pickle, and the succulent roots are much esteemed.

Radium (rā′di-um), an elementary chemical substance discovered by Madam Curie, a Polish physicist, with the aid of her husband, in 1898. The property of radio-activity, that is, of the production of photographic effects by certain substances without the aid of light, discovered by Becquerel in uranium in 1896, led a number of physicists to experiments in this direction. In the hope of finding a substance in combination with uranium to which this property was due the Curies began a series of chemical reductions of pitch-blende, a mineral containing uranium, and found the radio-activity to increase as this substance was reduced, until finally a minute quantity of a constituent of pitch-blende was obtained which proved immensely more radio-active than uranium. This material was thought to be a new element. It was at first obtained only in combination with barium, but in 1910 Madame Curie succeeded in decomposing this compound and isolating radium, thus demonstrating its elementary character. This element has a high atomic weight (225 according to Curie, 257.8 according to Hertly), this being a characteristic of all known radio-active bodies. The study of radium proved it to be possessed of extraordinary powers, previously unknown in any substance, and giving physicists new ideas as to the constitution of matter. Chief among these powers was that of emitting rays of three different kinds, which were thrown off at immense speed. One of these, which apparently consists of electrons (which see), is given off at a speed approaching that of light. A second, which appears to consist of helium, a substance heavier than hydrogen, is thrown off at a speed of 20,000 miles per second. The third kind is apparently a radiation, perhaps equivalent to the Roentgen ray. Another strange property of radium is its ability to maintain itself at a temperature a little higher than that of surrounding matter, a gramme of it giving out in an hour heat sufficient to raise 100 grammes of water 1° C. This heat production may be the result of energetic changes going on in the atom, and giving rise to its radiant action. In addition radium — with thorium and uranium — gives off emanations which have peculiar qualities. These are yielded in the form of gas, but can be solidified at low temperatures, and are then themselves temporarily radio-active. The radium emanation appears to change gradually into helium, and the apparent emission of helium as a ray would indicate that it is a product of atomic changes within the mass. The whole quantity of radium so far isolated is very minute, and the cost of operation keeps it at a very high price, yet it possesses powers of action on organic substance which may possibly prove of great medical value when fully understood. When heedlessly kept near the skin its rays produce severe burns, which are difficult to heal, and it is thought that it may prove useful in treating cancer and other external affections. Experiment, however, has not yet gone far enough to demonstrate its powers as a therapeutic agent.

Radix (rā′diks; L., a root), in mathematics, any number which is arbitrarily made the fundamental number or base of any system of numbers. Thus 10 is the radix of the decimal system of numeration; also in Briggs' or the common system of logarithms, the radix is 10; in Napier's it is 2.7182818284. See *Logarithms*.

Radnor (rad′nur), or RADNORSHIRE, an inland county in South Wales; area, 471 square miles. The surface throughout is hilly, the highest summit of the Forest of Radnor reaching an elevation of 2163 feet above sea-level. Oats and wheat are the principal crops, but the chief dependence of the farmer is on the stock reared on the pasture and commonlands, which support large numbers of sheep and cattle. The original Welsh ponies are still bred in the mountains. Large quantities of butter are made. The chief manufacture is flannel, but it is of no great extent. Pop. (1911) 22,589. The chief towns are Presteign, New Radnor and Knighton, all small places.

Radom (rä′dom), a town in Russian Poland, on the Radomka, capital of the government of the same name. It has manufactures of oil, vinegar, and leather. Pop. 28,749.— The government has an area of 4768 square miles; forms the most elevated portion of the Polish plain; is much wooded; agriculture and cattle-raising are the chief occupations of the inhabitants. The iron industry is important. Pop. 820,363.

Rae (rā), JOHN, an Arctic traveler born in the Orkneys, studied medicine at Edinburgh, became surgeon in the Hudson Bay Company's service in 1833, and made several exploring expeditions through the Northwest and to the Arctic coasts. He accompanied Sir John Richardson in his Franklin search (1848) in the Mackenzie and Copper-

mine region; conducted an expedition in 1850, and again in 1853-54, when his party discovered the first traces of Franklin's fate, for which he received the government grant of £10,000. He published *Expedition to the Shores of the Arctic Sea in 1846-47* (1850). Died in 1893.

Raeburn (rā'burn), Sir Henry, an eminent portrait-painter, born at Edinburgh in 1756. Bound apprentice to a goldsmith, he was no sooner free than he devoted himself to potrait painting, and with the view of improving in his art repaired to London, afterwards spending two years in Italy. Returning in 1787, he established himself in Edinburgh, and soon rose to the head of his profession in Scotland. His portraits are distinguished by grasp of character, breadth of treatment, and excellent color. He was knighted by George IV in 1822, and died the following year.

Raff (raf), Joachim, musical composer, born in Switzerland, of German parents, in 1822; died in 1882. He was encouraged by Mendelssohn and Liszt, and having gone in 1850 to live at Weimar, in order to be near Liszt, his opera, *König Alfred*, was first performed there at the Court Theater. His *Dame Kobold*, a comic opera, was produced in 1870, but his reputation rests chiefly on his symphonies (*Im Wald*, *Lenore*, etc.). He wrote also much chamber music of undoubted excellence. In 1877 he was appointed director of the Conservatoire at Frankfort, where he died. He was a sincere supporter of the Wagner school in music.

Raffael'lo. See *Raphael.*

Raffia. See *Raphia.*

Raffle (raf'l), a game of chance, in which several persons each deposit part of the value of a thing for the chance of gaining the whole of it.

Raffles (raf'felz), Sir Thomas Stamford, an English naturalist, born in 1781, died in 1826. He entered the East India Company's civil service, and in 1811, on the reduction of Java by the British, he was made lieutenant-governor of the island. In this post he continued till 1816, when he returned to England with an extensive collection of the productions, etc., of the Eastern Archipelago. The year following appeared his *History of Java.* Having been appointed to the lieutenant-governorship of Bencoolen, Sumatra, he went out in 1818 to fill this post; founded the settlement of Singapore, and returned to Europe in 1824.

Rafflesia (raf-lē'zi-a), a genus of parasitical plants, order Rafflesiaceæ, of which the chief species is *R. Arnoldi.* This gigantic flower, one of the marvels of the vegetable world, was discovered in the interior of Sumatra by Sir Thomas Raffles and Dr. Arnold. The whole plant seems to consist of little else beyond the flower and root. The perianth or flower forms a huge cup reaching a width of 3 feet or more; it weighs from 12 to 15 lbs., and some of its parts are ¾ inch in thickness. It is fleshy in character and appearance, remains expanded for a few days, and then begins to putrefy, having quite the smell of carrion, and thus attracting numerous insects.

Rafflesia Arnoldi.

Rafflesiaceæ (raf-lē-si-ā'se-ē), a natural order of parasitical plants or rhizogens, the species of which are found in the East Indies, Java, Sumata, etc., and in South America. The genus *Rafflesia* is the type. See *Rafflesia.*

Rafinesque (raf-in-esk'), Constantine Samuel, botanist, born in Galatz, Turkey, in 1784. He settled in the United States in 1815, and was made Professor of Botany in Transylvania University, Lexington, Ky., in 1818. Later, after lecturing in various places, he removed to Philadelphia. His publications include *Ancient History, or Annals of Kentucky*, *Medical Flora of the United States*, etc. He died Sept. 18, 1842.

Raft, a sort of float formed by a body of planks or pieces of timber fastened together side by side so as to be conveyed down rivers, across harbors, etc.; also any rough floating structure, such as those often formed in cases of shipwreck of barrels, planks, etc.

Rafters (raf'terz), are pieces of timber which, resting by pairs on the side walls of a building, meet in an

angle at the top, and form the main support of the roof.

Ragatz (rä′gatz), a town of Switzerland, canton of St. Gall, situated at the junction of the Tamina with the Rhine, 1700 feet above the sea, and connected by railway with Zürich and Coire. It is much resorted to both for its beautiful scenery and its mineral waters. Pipes are laid from Pfäffers, on the mountain side, by which the water is brought down from the hot springs there to a spacious bathing establishment without losing its high temperature. The permanent population is only about 2000, but there is a large number of visitors, for the accommodation of whom large hotels, restaurants, etc., have been provided. There is also a bathing establishment near the springs, erected in 1704. The temperature of the water is 97°-100°, and it is impregnated with carbonate of lime, magnesia, and salt. The village of Pfäffers lies 2 miles south of Ragatz at a height of 2696 feet.

Ragee (ra-gē′), RAGGEE, an Indian grain (*Eleusine coracāna*), very prolific, but probably the least nutritious of all grains. In the form of cake or porridge it is the staple food of the poorer classes in Mysore and on the Neilgherries.

Ragged Schools, institutions supported in Britain by voluntary contributions, which provide free education, and in many cases food, lodging, and clothing for destitute children, and so aid in preventing them from falling into vagrancy and crime. These schools differ from certified industrial schools in that the latter are for the reception of vagrant children and those guilty of slight offenses; but the two institutions are frequently combined. The idea of forming such schools was due to a Portsmouth cobbler, John Pounds, who about 1819 began to take in the ragged children of the district in which he lived and teach them while he was at work. The name of Dr. Guthrie, of Edinburgh, is prominent among those who developed this scheme of rescue.

Raghuvansa (ra-gö-vän′sä), the title of one of the most celebrated Sanskrit poems. Its subject is the legendary history of the solar kings, or kings descended from the sun.

Raglan (rag′lan), FITZROY JAMES HENRY SOMERSET, LORD, born in 1788, youngest son of Henry, fifth duke of Beaufort, entered the army in 1804; was attached in 1807 to the Hon. Sir Arthur Paget's embassy to Turkey; and the same year served on Sir Arthur Wellesley's staff in the expedition to Copenhagen. He acted as military secretary to Wellesley during the Peninsular war, in which he greatly distinguished himself at the capture of Badajoz. At Waterloo he lost his right arm. From 1816 to 1819 he acted as secretary to the embassy at Paris; and from 1819 to 1852 as military secretary to the Duke of Wellington. In 1852 he was made master-general of the ordnance, and was elevated to the House of Peers as Baron Raglan. On the breaking out of the Crimean war he received the appointment of commander of the forces, and displayed much personal bravery as well as an amiable and conciliatory temper; but he had no great fitness for the position in which he was placed, and the repulse of the allies in their attack on the Redan, allied with other causes, aggravated the mild form of cholera from which he was suffering, and he expired June 28, 1855.

Ragozin (rag′o-zin), ZENAIDE ALEXEIEVNA, a Russian authoress, who became a citizen of the United States in 1874. She wrote *Siegfried, the Hero of the Netherlands; Beowulf, the Hero of the Anglo-Saxons,* and several works for the *Stories of the Nations* series.

Ragman Roll, the name of the collection of those instruments by which the nobility and gentry of Scotland were constrained to subscribe allegiance to Edward I of England in 1296, and which were more particularly recorded in four large rolls of parchment, consisting of thirty-five pieces sewed together, kept in the Tower of London.

Ragnarök (rag′na-rėk), in Scandinavian mythology, literally twilight of the gods, or doom of the gods, the day of doom when the present world will be annihilated to be reconstructed on an imperishable basis.

Ragout (ra-gö′; French, ragoût,) meat or fish stewed with vegetables, and highly seasoned to excite a jaded appetite.

Rags, though valueless for most purposes, are yet of great importance in the arts, particularly in paper-making. (See *Paper.*) Besides the rags collected in the United States, the article is imported in large quantities from various foreign countries. Woolen rags, not being available for paper, are much used for manure; but those of a loose texture, and not too much worn, are unraveled by means of machinery, and mixed up with good wool, to form what is known as *shoddy,* with which cheap woolen goods are made; while the refuse

is pulverized and dyed various colors, to form the flock used by paper-stainers for their flock-papers.

Ragstone (rag′stōn), a stone of the siliceous kind, so-named from its rough fracture. It effervesces with acids, and gives fire with steel. It is used for a whetstone without oil or water for sharpening coarse cutting tools. It is abundant in parts of England, as Kent and Newcastle. The term is also applied to certain limestones which contain many fragments of shells resembling rags.

Ragusa (rȧ-gö′zȧ), a seaport of Austria, in Dalmatia, on a peninsula in the Adriatic, is surrounded by old walls flanked with towers, and has several forts. The streets rise terrace-wise, and none of the edifices are remarkable. The trade is now insignificant compared with former times. Ragusa is supposed to have been founded by Greeks in B.C. 589. Falling successively under the dominion of the Romans and the Greek emperors, it finally asserted its independence, which it long maintained, though having to pay tribute to one or other of its powerful neighbors. In 1814 it finally came into the possession of Austria. Pop. 13,174.

Ragu′sa, a town of Sicily, 29 miles W. S. W. of Syracuse, on the right bank of the river of its name, divided into Upper and Lower Ragusa. It has considerable manufactures of silk stuffs, and a trade in corn, wine, oil, etc. Pop. (1906) 36,395.

Ragwort (rag′wurt), RAGWEED, the popular name of various species of composite plants of the genus *Senecio*, found in Europe, so-called from the ragged appearance of the leaves. The common ragwort (*S. Jacobæa*) is a perennial with golden yellow flowers, growing by the side of roads and in pastures. It is a coarse weed, refused or disliked by horses, oxen, and sheep, but eaten by hogs and goats.

Rahway (rą′wā), a city of Union Co., New Jersey, on the Rahway River, 19 miles S.W. of New York. It has extensive manufactures of printing presses, woolen goods, belts, laces, chemicals, carriages, etc. Pop. 9337.

Raiatea (rī-ä-tā′ä), one of the Society Islands in southeastern Polynesia; area, 75 sq. miles; pop. 1400, who have been converted to Christianity by English missionaries, and are governed by their own chiefs.

Rai Bareli (rī ba-rā′lē), a town of Oudh, India, administrative headquarters of district of the same name, on the banks of the Sai, 48 miles S.E. of Lucknow. There is a bridge over the Sai, several interesting ancient structures, and the usual government buildings. Pop. about 20,000.—The district forms the southernmost division of Oudh, has an area of 4881 square miles, and a population of about 3,000,000.

Raibolini (rī-bo-lē′nē), FRANCESCO DI MARCO DI GIACOMO, usually called FRANCESCO FRANCIA, a famous Italian painter, engraver, medallist, and goldsmith, was born at Bologna about the middle of the 15th century; died in 1533. He excelled particularly in *Madonnas*, and executed a number of admirable frescoes in the church of St. Cecilia at Bologna, but his most famous work is an altar-piece exhibiting the *Madonna*, *St. Sebastian*, etc., in the church of St. Giacomo Maggiore in the same city. Three works of his are in the British National Gallery. He was also celebrated as a portrait painter. Raibolini had a son, Giacomo, who studied under him, and acquired considerable celebrity.

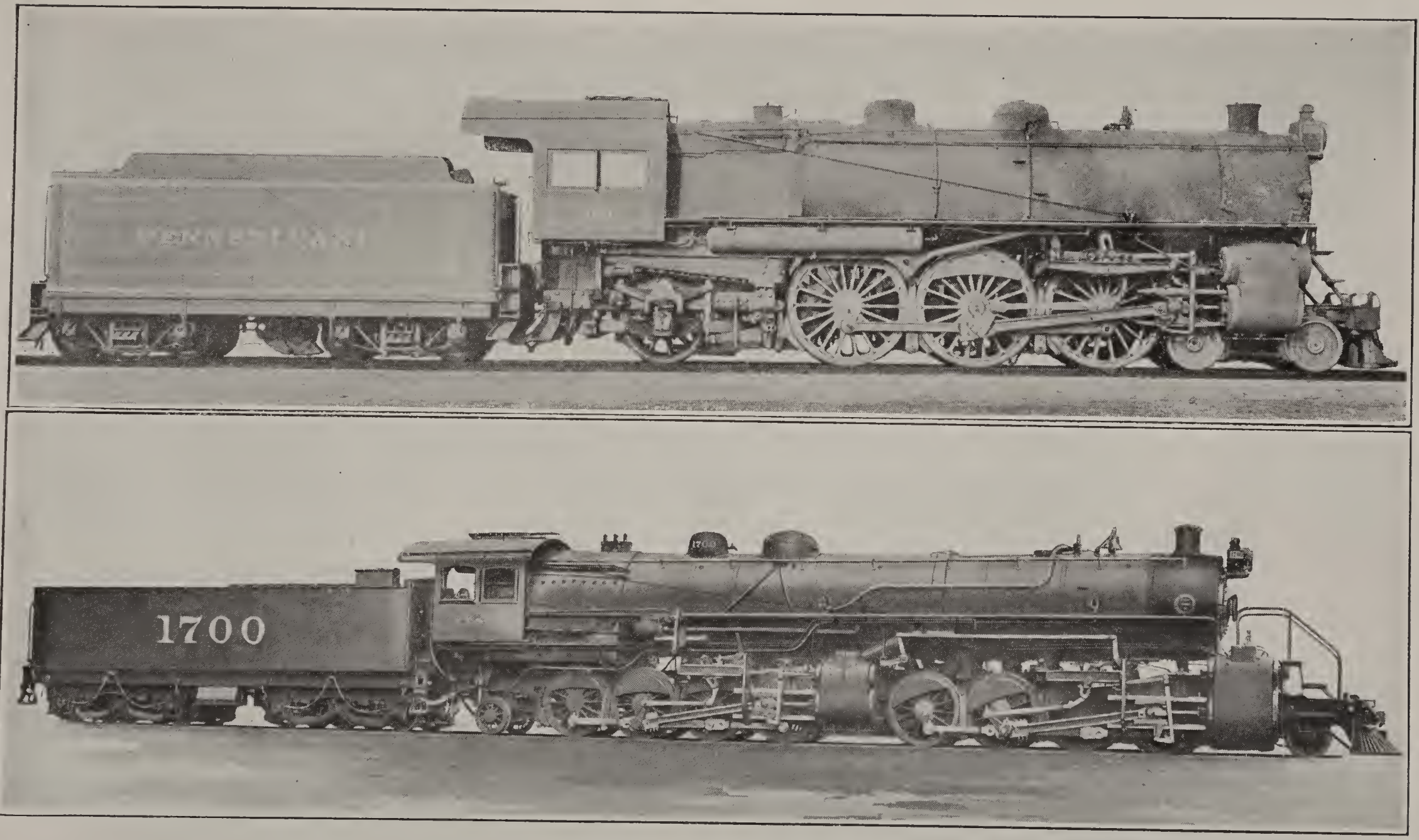
Ráigarh (rä-i-gar′), a native state of India, Central Provinces; area, 1486 square miles; pop. 128,943.

Raiidæ (rā′i-dē), the family of fishes to which the rays (skate, etc.) belong. See *Ray*.

Raikes (rāks), ROBERT, an English philanthropist, born at Gloucester in 1735; died in 1811. He was proprietor of the *Gloucester Journal*, and originated the system of Sunday-schools by gathering together a number of street children for secular and religious training.

Ráikot (rī-kōt′), a town of Hindustan, in the Punjab, surrounded by a wall and substantially built, formerly capital of a native state. Pop. 9219.

Rail (rāl), the common name of the Rallidæ, a family of grallatorial birds comprehending the rails proper (*Rallus*), the coots, water-hens, and crakes. They are characterized by possessing a long bill, which is more or less curved at the tip and compressed at the sides, by having the nostrils in a membranous groove, the wings of moderate length, the tail short, the legs and toes long and slender, the hind-toe placed on a level with the others. Most of the members of the family are aquatic or frequent marshes; but some, as the crakes, frequent dry situations. The principal species of the genus *Rallus* are the water rail of Europe (*R. aquaticus*), about 11 inches in length, of an olive-



Courtesy of the Pennsylvania Railroad and the Baldwin Locomotive Works.

MODERN LOCOMOTIVES

The upper view shows a passenger locomotive used on the fastest heavy express trains. It weighs 272,000 pounds, with tender 70 feet long, and has a draw bar pull of 30,700 pounds. The lower view shows a Mallet Articulated Type freight locomotive, one of the largest ever built. It consists of two units, linked together to give flexibility to the wheel base. The locomotive is 108 feet 10 inches long, weighs 700,000 pounds, and has a draw bar pull of 96,000 pounds. Oil is used for fuel.

brown color, marked with black above, and of a bluish-ash color beneath, with white transverse markings on the belly, much esteemed for the table; the Virginian rail of America (*R. virginianus*), somewhat smaller than the water rail of Europe, but a favorite game bird; and the great-breasted rail or fresh-water marsh-hen (*R. elegans*), about 20 inches long, which inhabits the marshes of the Southern States of America. The land rail, so-named, is the corn-crake (*Crex pratensis*). See *Corn-crake*.

Railroad, Railway (rāl′rōd, rāl′wā), a road made by placing on the ground, on a specially prepared track, continuous parallel lines of iron or steel rails, on which cars with flanged wheels are run with little friction and at consequent high velocities. These are usually called railroads in the United States and railways in other English-speaking countries, though the use of the word railway is growing in the former. The necessity for railways originated in the requirements of the coal traffic of Northumberlandshire, where the first of these, formed on the plan of making a distinct surface and track for the wheels, were constructed. In 1676, near Newcastle-on-Tyne, the coals were conveyed from the mines to the banks of the river, 'by laying rails of timber exactly straight and parallel; and bulky carts were made, with four rollers fitting those rails, whereby the carriage was made so easy that one horse would draw 4 or 5 chaldrons of coal.' Steam-power was first used on these tram-roads early in the nineteenth century, but the inauguration of the present great railway system of England dates from 1821, when an act was passed for the construction of the Stockton and Darlington Railway, which was opened in 1825. The Liverpool and Manchester line was opened in 1830 and other lines quickly followed until 1846, when upwards of 250 acts for the construction of railway lines were passed, the speculating mania culminating in a disastrous panic. The United States quickly followed Great Britain in railway construction. Indeed, it preceded England in steam transportation, as Oliver Evans, of Philadelphia, constructed a steam-dredging machine in 1804 which propelled itself on wheels a distance of 1½ miles through the streets. The use of steam engines on railroad tracks in the United States quickly followed their introduction in England, the first road for passenger traffic being the Baltimore and Ohio, built 1828–38, an American-built locomotive being used on it in 1830. From that time forward the railroad system was rapidly extended, until the United States reached and surpassed all other countries in this means of travel and freight carriage. There was no development of the railway system in France till about 1842, when several great lines were established; Belgium and the Netherlands followed, but Germany, Austria, and Russia were somewhat behind the Western European nations in their railway development. Within recent years the system has developed with remarkable rapidity and is being introduced with considerable activity in Africa and Asia, where an extensive railway construction is now under way.

The modern railway consists of one or more pairs of parallel lines of iron or steel bars, called *rails*, these bars joining each other endwise, and the parallel lines being several feet apart. The ends of the rails are held together by two strips of metal known as *fish-plates* which are bolted, one on either side, to the ends of the rails. The width between rails is called the *gauge*. What is known as the national or standard gauge used in the United States and the greater part of Europe, and formerly called the *narrow gauge*, measures 4 feet 8½ inches between the rails; the *broad gauge* (now going out of use) being 7 feet. It is believed to have originally represented the width suitable for the coal wagons of the north of England, and has been found on the whole very satisfactory. In Ireland the gauge is 5 feet 3 inches, in India 5 feet 6. Narrower gauges are used in certain special lines in all countries. A pair of parallel lines of rails constitutes a *single line* of railway, two pairs a *double line*, and so on. The rails are fastened by heavy spikes or bolts to wooden or iron (sometimes stone or concrete) supports called *sleepers* or *ties*, placed at frequent intervals and embedded in the material of the roadway. A railway, in general, approaches as nearly to a straight line between its two extremes as the nature of the country and the necessities of the intermediate traffic will permit. It is carried over valleys, either by *embankments* or *viaduets*, and through hills or elevated ground by deep trenches called *cuts*, or by tunnels. In favorable cases the surface line of the railway is so adjusted that the materials excavated from the cuttings will just serve to form the embankments. Should the excavated materials be in too small quantity to form the embankment, recourse is had to an excavation along the sides of the site of the latter to supply the deficiency. The line of rail-

way can seldom run for any distance on a level, and its various slopes are termed *gradients*, the arrangement of the rises and falls being termed the *grading* of the line. A more or less steep ascent is termed an *incline*. When the line is formed its surface is covered with broken stones or clean gravel called *ballasting*, and in this the sleepers for sustaining the rails are embedded. The wooden sleepers are laid across the roadway 2 or 3 feet apart from center to center, and to them the rails are spiked. When the railway track is thus completed the work is called the *permanent way*, and it furnishes the route over which railway cars of various kinds are drawn by a locomotive engine, a number of these vehicles forming a *train*.

In the railway of a single line of rail it is necessary to make provision for permitting meeting engines or cars to pass each other by means of *sidings*, which are short additional lines of rail laid at the side of the main line, and so connected with it at each extremity that a train can pass into the siding in place of proceeding along the main line. In double lines, in addition to sidings, which are in them also required at many places, it is necessary to provide for trains or cars crossing from one line of rails to another. This change in the direction of the carriage is effected by *switches*. *Switches* are short movable rails close to the main rails connected by rods to suitable handles, the extremities of these short rails being formed so as to guide the flanges of the wheels of a car from one line of rail to another. Switches are usually coupled or interlocked with the signals or signaling apparatus, so necessary for properly carrying on the traffic — coupled when they are moved simultaneously with the signals, interlocked when the necessary movement of the switches is completed before the signal is moved. Signaling is effected by means of semaphores in daylight and lights of three colors, white, green or blue, and red, at night. The telegraph is also used in regulating the traffic. (See *Block System.*) The various places along the line of railway, where trains stop for taking up or depositing freight or passengers are termed *stations* or *depôts*, with the prefix of *freight* or *passenger*, as they are allotted to the one or the other; the stations at the extremities of a railway are called *terminals*. In England coaches are called *carriages;* cars *trucks*, freight *goods*, baggage *luggage*.

The mode in which the locomotive acts in moving the trains of loaded cars is that by its weight and the friction of its wheels on the rails a tractive force is provided sufficient to enable it to move at a high rate of velocity, and to drag great loads after it. In some particular cases a fixed engine is employed to give motion to a rope by which the cars are drawn, the rope being either an endless rope stretched over pulleys, or one which winds and unwinds on a cylinder. Such engines are termed *stationary* engines, and are used chiefly on inclined planes, where the ascent is too steep for the locomotive engine. In some cases the cars are impelled by atmospheric pressure or by electricity. (See *Atmospheric Railway*, *Electric Railway.*) The locomotives, passenger cars, freight cars, etc., constitute the *rolling stock* of a railroad. In Britain the railway cars are usually from 20 to 30 feet in length, and are divided into compartments. There also, as in Europe generally, three classes of cars are used, to meet the varied demands of the traveling public. American cars are from 40 to 60 feet long with a center passage, the doors being at the ends — with the seats arranged transversely on each side. A platform at the end enables a person to go from end to end of the train. There is generally in the United States only one class of passengers, though on long journeys Pullman and other sleeping-cars are used at extra fares. (See *Pullman Car.*) Railways for the local service of large cities run usually on the street surface, but a system of overhead railways exists in some cities, as in New York, and subways or underground railways are rapidly extending, as in London, Paris, New York, Boston, Philadelphia, and Chicago.

Some of the tunnels, bridges, and viaducts constructed in connection with railways are among the engineering triumphs of the age. Of the former the most notable are the Mt. Cenis, St. Gothard, Arlberg, Simplon, and Loetschberg tunnels in the Alps; the Severn Tunnel in England, the Hoosac Tunnel in Massachusetts, the Pennsylvania Railroad Tunnel under New York City and the Trans-Andine Tunnel between Chile and Argentina. The greatest of the railway bridges are those over the Forth and the Tay in Scotland; the Britannia Tubular Bridge over the Menai Straits, in Wales; the Victoria Tubular Bridge, Montreal; the Eads bridge over the Mississippi at St. Louis. (See *Forth Bridge*, *Tay Bridge*, also *Bridge.*) There are many stone viaducts of great length.

In Britain the railways are the property of joint-stock companies, who construct and work them under the powers

BIRD'S EYE VIEW PENNSYLVANIA RAILROAD STATION

THE CONCOURSE PENNSYLVANIA RAILROAD STATION

In the new Pennsylvania Railroad Station at Seventh Avenue and Thirty-second Street, New York City, the trains arrive and depart by a remarkable tunnel system extending under both rivers.

granted by act of parliament, and the same is the case in the United States, the railroads being owned by private companies, though to some extent controlled in their operation by Congress. In Europe generally the railways are owned and operated to a large extent by the government, this system existing everywhere except in the United States and Britain. Railways were at first local undertakings, but in the United States and Britain they have now come under the control of a few giant companies. Generally the American railways have hitherto been of a much less solid and substantial character than those of Britain, but this condition is rapidly being changed in the great trunk lines, some of which have been made of very substantial structure. The transcontinental lines of the United States include the Northern Pacific, from Lake Superior to the Pacific Coast; the Union Pacific, from San Francisco to the Eastern States; the Atchison, Topeka & Santa-Fe, the Southern Pacific, and the Great Northern, five systems in all, these ranging from 5000 to over 10,000 miles in length of track controlled. The only railway which competes with these great lines is the Trans-Siberian, of nearly 7000 miles' length of main line. In Canada the most important line in the Dominion is the Canadian Pacific, of government construction, which, connecting with the Intercolonial at Montreal, forms a through line of 4200 miles from the West coast of British Columbia to Halifax in Nova Scotia. Other railways to the Pacific are in course of construction. (See *Canadian Pacific Railway.*)

In all countries the government exercises the right of granting or refusing permission to construct and operate railroads. Abuses of the United States management in America led to a movement in 1871 which secured laws adverse to the companies, limiting rates and prohibiting discrimination. This led in 1887 to the Interstate Commerce Act, passed to regulate rates, etc., and recently to an act prohibiting rebates in freight charges. Other legislation affecting railroad management has been passed by Congress, and the railroads are coming gradually under government control in the details of their operative methods. In 1910 Congress created a special court, called the Court of Commerce, having jurisdiction over railroad judicial cases, such as may be instituted by the Interstate Commerce Commission. The purpose of this court is to expedite the hearing of cases arising from railroad management.

Within recent years there has been great progress in railroad building, the construction of locomotives and cars, and the adoption of safety appliances in railroad operation. For an important instance of this see *Block System.* There has been great improvement in signaling, the telephone is beginning to supersede the telegraph in train handling, and station accommodation has greatly improved. Notable instances are the magnificent new Pennsylvania and Grand Central Stations in New York. The size and weight of locomotives have enormously increased over those of early days, some of the passenger locomotives now in operation weighing more than 200,000 pounds. The freight locomotives are still heavier, the Mallet compound weighing 400,000 pounds. The same may be said of cars, both freight and passenger, which have increased greatly in weight and strength, sleeping cars being now in use weighing 115,000 pounds. In regard to speed the same may be said, the original 20 miles or less per hour having climbed up gradually until 60 miles per hour for considerable distances is not infrequent, while considerably greater speed has been attained. The fastest time on record for a distance of over 440 miles was made by the Lake Shore and Michigan Southern R. R. in 1905, it running from Buffalo to Chicago, 525 miles, in 7 h. 50 m., an average of 69.69 miles per hour. For shorter runs speeds ranging from 70 to 84 miles per hour have been made, the greatest on record being a run of 4.8 miles in $2\frac{1}{2}$ min., a rate of 115.20 miles per hour, on the Philadelphia & Reading. The railroad mileage in the United States has grown enormously, reaching in 1912 the great total of about 245,000 miles. At the same date the length of railway in the whole world was about 600,000 miles, so that this country possesses 40 per cent. of the whole. America as a whole has about 300,000 miles, Europe 200,000, Asia 60,000, Africa, 20,000 and Australia 20,000. The cost of construction is highest in Great Britain, averaging $271,000 per mile. In the United States it is lower than anywhere in Europe, averaging $68,800 per mile.

Railroad Rates. For years past the railroads of the United States have been accused of unjustly favoring large shippers in freight charges, and efforts to restrain them from this practice by legislation have been made. The giving of passes to favored persons has been restricted by law, and a bill was passed in 1910 by which the government was given control over the

railroad freight rates and all discriminations between shippers by the giving of rebates or in other ways strictly forbidden, under penalty of fine and imprisonment. The government was given the right to control and adjust rates, and prescribe just and reasonable rates, to investigate abuses, and in other ways to oversee and control railroad operations, and a court of commerce was instituted with the power of dealing with all charges of unjust dealing by 'common carriers.' As the matter now stands, the independent power of the railroads is greatly restricted, and, aside from direct ownership, they have been made largely government institutions.

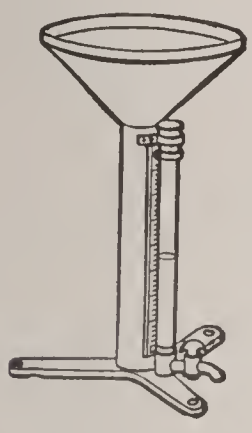
Raimondi (rī-mōn'dē), MARK ANTONIO, a famous Italian engraver; born in 1488, died in 1534. He was a friend of Raphael, who employed him to engrave some of his paintings, and was the first Italian engraver to attain great celebrity.

Rain (rān), the water that falls from the heavens. Rain depends upon the formation and dissolution of clouds. The invisible aqueous vapor suspended in the atmosphere, which forms clouds, and is deposited in rain, is derived from the evaporation of water, partly from land, but chiefly from the vast expanse of the ocean. At a given temperature the atmosphere is capable of containing no more than a certain quantity of aqueous vapor, and when this quantity is present the air is said to be saturated. Air may at any time be brought to a state of saturation by a reduction of its temperature, and if cooled below a certain point the whole of the vapor can no longer be held in suspension, but a part of it, condensed from the gaseous to the liquid state, will be deposited in dew or float about in the form of clouds. If the temperature continues to decrease, the vesicles of vapor composing the cloud will increase in number and begin to descend by their own weight. The largest of these falling fastest will unite with the smaller ones they encounter during their descent, and thus drops of rain will be formed of a size that depends on the thickness, density, and elevation of the cloud. The point to which the temperature of the air must be reduced in order to cause a portion of its vapor to form clouds or dew is called the dew-point. The use of the spectroscope has become to some extent a means of anticipating a fall of rain, since when light that has passed through aqueous vapor is decomposed by the spectroscope a dark band is seen (the *rain-band*), which is the more intense the greater the amount of vapor present. The average rainfall in a year at any given place depends on a great variety of circumstances, as latitude, proximity to the sea, elevation of the region, configuration of the country and mountain ranges, exposure to the prevailing winds, etc. When the vapor-laden atmosphere is drifted towards mountain ranges it is forced upwards by the latter, and is consequently condensed, partly by coming into contact with the cold mountain tops, and partly by the consequent expansion of the air due to the greater elevation. The presence or absence of vegetation has also considerable influence on the rainfall of a district. Land devoid of vegetation has its soil intensely heated by the fierce rays of the sun, the air in contact with it also becomes heated, and is able to hold more and more moisture, so that the fall of rain is next to impossible. On the other hand, land covered with an abundant vegetation has its soil kept cool, and thus assists in condensation. Although more rain falls within the tropics in a year, yet the number of rainy days is less than in temperate climes. Thus in an average year there are 80 rainy days in the tropics, while in the temperate zones the number of days on which rain falls is about 160. At the equator the average yearly rainfall is estimated at 95 inches. At a few isolated stations the fall is often very great. At Cherrapungee, in the Khasia Hills of Assam, 615 inches fall in the year, and there are several places in India with a fall of from 190 to 280 inches. The rainfall at Paris is 22 in.; London 22.50.; New York, 43 in.; Washington, 41 in.; San Francisco, 22 in.; Sitka, Alaska, 90 in.; Honduras, 153 in.; Maranhão, 280 in.; Singapore, 97 in.; Canton, 78 in.; New South Wales, 46 in.; South Australia, 19 in.; Victoria, 30 in.; Tasmania, 20 in.; Cape Colony, 24 in. The greatest annual rainfall hitherto observed seems to be on the Khasia Hills.

Rainbow (rān'bō), a bow, or an arc of a circle, consisting of all the prismatic colors, formed by the refraction and reflection of rays of light from drops of rain or vapor, appearing in the part of the heavens opposite to the sun. When the sun is at the horizon the rainbow is a semicircle. When perfect the rainbow presents the appearance of two concentric arches; the inner being called the *primary*, and the outer the *secondary* rainbow. Each is formed of the colors of the solar spectrum, but the colors are arranged in the reversed order, the red forming the exterior ring of the primary bow, and the interior of the

secondary. The primary bow is formed by the sun's rays entering the upper part of the falling drops of rain, and undergoing two refractions and one reflection; and the secondary, by the sun's rays entering the under part of the drops, and undergoing two refractions and two reflections. Hence, the colors of the secondary bow are fainter than those of the primary.

Rain-gauge (rān-gāj), or PLUVIOMETER (plö-vi-om'e-tėr), an instrument used to measure the quantity of rain which falls at a given place. It is variously constructed. A convenient form consists of a cylindrical tube of copper, with a funnel at the top where the rain enters. Connected with the cylinder at the lower part is a glass tube with an attached scale. The water which enters the funnel stands at the same height in the cylinder and glass tube, and being visible in the latter the height is read immediately on the scale, and the cylinder and tube being constructed so that the sum of the areas of their sections is a given part, for instance a tenth of the area of the funnel at its orifice, each inch of water in the tube is equivalent to the tenth of an inch of water entering the mouth of the funnel. A stop-cock is added for drawing off the water. A simpler form of gauge consists of a funnel having at the mouth a diameter of 4.697 inches, or an area of 17.33 square inches. Now as a fluid ounce contains 1.733 cubic inches, it follows that for every fluid ounce collected by this gauge the tenth of an inch of rain has fallen. Recently-constructed automatic gauges give a continuous record of rainfall, indicate the duration of each shower, the amount of rain that has fallen, and the rate at which it fell.



Rain-gauge.

Rain-tree (*Pithecolobium saman*), a leguminous tree of tropical America, now largely planted in India for the shade it furnishes, and because it flourishes in barren salt-impregnated soils, as well as for its sweet pulpy pods, which are greedily eaten by cattle. Another species, *P. dulce*, has also been introduced into India, its pods also being edible.

Rainy Lake, or RÉNÉ LAKE, a body of water forming part of the boundary between Minnesota and Canada. It is about 50 miles long, and of irregular breadth; receives the waters of numerous small lakes from the east and northeast, and empties itself by Rainy River, about 90 miles long, into the Lake of the Woods.

Raipur (rī-pör'), a town of India, headquarters of district of same name in the Chhattisgarh division, Central Provinces. It has an ancient fort, the usual government buildings, important schools, and does a large trade in grain, lac, cotton, etc. Numerous water-tanks are in the vicinity. Pop. 32,114.— The district includes within its limits four small feudatory states with a total area of 14,553 square miles.

Rais, or RETZ (rā or rās), GILLES DE LAVAL, SEIGNEUR DE, French marshal, born in 1396, died in 1440. He distinguished himself in the wars with the English, and acquired a disgraceful celebrity for outraging and murdering 140 or 160 children, and for other atrocities. He was hung and burnt for his crimes. See *Bluebeard.*

Raised Beaches. See *Beaches, Raised.*

Raisins (rāz'nz), the dried fruit of various species of vines, comparatively rich in sugar. They are dried by natural or artificial heat. The natural and best method of drying is by cutting the stalks bearing the finest grapes half through when ripe, and allowing them to shrink and dry on the vine by the heat of the sun. Another method consists of plucking the grapes from the stalks, drying them, and dipping them in a boiling lye of wood-ashes and quicklime, after which they are exposed to the sun upon hurdles of basket-work. Those dried by the first method are called raisins of the sun or sun-raisins, muscatels, or *blooms;* those by the second, *lexias.* The inferior sorts of grapes are dried in ovens. Raisins are produced in large quantities in the south of Europe, Egypt, Asia Minor, California, etc. Those known as Malagas, Alicantes, Valencias, and Denias are well-known Spanish qualities. A kind without seeds, from Turkey, are called *sultanas.* The Corinthian raisin, or currant, is obtained from a small variety of grape peculiar to the Greek islands. The uses of raisins as a dessert and culinary fruit, and in the manufacture of wine, are well known.

Rajah, or RÂJÂ (rä'jä), in India, originally a title which belonged to those princes of Hindu race who, either as independent rulers or as feudatories, governed a territory; subsequently, a title given by the native governments, and in later times by the British government, to Hindus of rank. It is now not unfrequently assumed by the

zemindars or landholders, the title *Mahârâjah* (great rajah) being in our days generally reserved to the more or less powerful native princes.

Rájápur′ (rä′jä-pör), two towns in India: (1) In the Bombay Presidency, at the head of a creek 15 miles from the sea. Pop. 7448. (2) In the N. W. Provinces, on the Jumna. Pop. 7329.

Rájmahál (räj-mâ-hâl′), a town in Hindustan, province of Bengal, on the Ganges, 68 miles W. N. W. of Murshidabad, formerly an important place, now little more than a collection of mud-huts.

Rájmahendri (raj-mâ-hen′drē), a town in Hindustan, capital of the Godavari district, Madras Presidency, on the east bank of the Godavari, just above its subdivision into two arms, 40 miles from the sea. Pop. about 30,000.

Rájpipla (räj-pē′plu), a native state of India, in Bombay Presidency, watered by the Nerbudda. Area, 1514 sq. miles; capital Nandod.

Rájputana (räj-pö-tä′nu), a large province of India, under the suzerainty of Britain since 1817, in the west part of Hindustan proper, extending from the Jumna and Chumbul Rivers west to Sind and Bhawalpur, and comprising the greater part of the Indian Desert. It includes the British district of Ajmere-Merwara and twenty autonomous states, each under a separate chief; has a total area of 127.540 square miles, and a pop. of 9,730,000. Rájputana is intersected by the Aravali Mountains, to the north of which the country is desert, and part of it wholly destitute of inhabitants, water, and vegetation. The soil is remarkably saline, containing many salt springs and salt lakes, and much of the well-water is brackish. To the south of the range the country is more fertile, being watered by the drainage of the Vindhya Mountains. The dominant race, though not the most numerous, is the Rájput, numbering about 700,000. They are the aristocracy of the country; and to a large extent they hold the land either as receivers of rent or as cultivators. They are essentially a military people, and many of their institutions bear a strong resemblance to the feudal customs which prevailed in Europe in the middle ages. They have likewise been celebrated for their chivalrous spirit, so unlike the effeminacy and duplicity of many of the oriental nations. The province, which is traversed by two railway lines, is administered by a governor-general's agent.

Rájputs (räj′pötz). See *Rájputana*.

Rájsháhi (räj-shä′hē), a division or commissionership of Bengal, extending from the Ganges to Sikkim and Bhutan. Area, 17,428 square miles; pop. 9,130,072.— Capital, Rámpur Beauleah.

Rake (rāk), an implement which in its simplest form consists merely of a wooden or iron bar furnished with wooden or iron teeth, and firmly fixed at right angles to a long handle. In

Horse-rake.

farming it is used for collecting hay, straw, or the like, after mowing or reaping; and in gardening it is used for smoothing the soil, covering the seed, etc. Large rakes for farm work are adapted for being drawn by horses; and there are many modifications both of the hand-rake and the horse-rake.

Rakoczy (rä-kō′tsi), a famous princely family, now extinct in the male line, which for some time ruled the principality of Siebenbürgen or Transylvania, and by maintaining the civil and religious rights of the inhabitants made itself equally serviceable to them and formidable to the house of Austria. The first prince of the name was Sigismund Rakoczy, who obtained the government in 1606. The line ended with Prince Francis Leopold, born 1676. He led the Hungarian insurgents against Austria in 1703, and died in exile in 1735.

Rakoczy March, a simple yet stirring march by an unknown composer, and a very favorite one with the army of Francis Rakoczy (see above). It was adopted by the Magyars as their national march.

Rakshasas (räk′sha-haz), in Hindu mythology, a class of evil spirits or genii, cruel monsters, frequenting cemeteries, devouring human beings, and assuming any shape at pleasure. They are generally hideous, but some, especially the females, allure by their beauty.

Râle (räl), in pathology, a noise or crepitation caused by the air passing through mucus in the bronchial

tubes or lungs. There are various râles — the *crepitant*, the *gurgling*, the *sibilant*, the *sonorous*, etc. The râle or rattle which precedes death is caused by the air passing through the mucus, of which the lungs are unable to free themselves.

Raleigh (rą̄l'i), a city of North Carolina, capital of the State and of Wake Co. It is near the center of the State, 143 miles N. N. W. of Wilmington, capital of North Carolina. Among the principal public buildings are the Statehouse with a handsome columned front, the courthouse, and post-office, all in granite. It is an important cotton and tobacco center, and has varied manufactures, including cotton, oil, and hosiery mills, fertilizer and car-works, etc. Pop. 19,218.

Raleigh (rą̄l'i), or RALEGH, SIR WALTER, navigator, warrior, statesman, and writer in the reigns of Elizabeth and James I, was the second son of a gentleman of ancient family in Devonshire, and was born in 1552. He studied at Oxford, and at the age of seventeen he joined a body of gentlemen volunteers raised to assist the French Protestants. Little is known of his adventures for some years, but in 1580–81

Sir Walter Raleigh.

he distinguished himself in the Irish rebellion, both by ability and severity. He now became a favorite at court, a result which has been traditionally attributed to an act of gallantry, namely, his throwing his embroidered cloak in a puddle in order that the queen might pass. In 1584 he obtained a charter of colonization and unsuccessfully attempted the settlement of Virginia in the following years, planting colonies on Roanoke Island, the colonists of which perished. In 1584, also, he obtained a large share of the forfeited Irish estates, and introduced there the cultivation of the potato. Through the queen's favor he obtained licenses to sell wine and to export woolens, was knighted and made lord-warden of the Stannaries or tin mines (1585), vice-admiral of Devon and Cornwall, and captain of the queen's guard (1587). In 1588 he rendered excellent service against the Spanish Armada, and subsequently vessels were fitted out by him to attack the Spaniards. In 1592 he incurred the queen's displeasure by an amour with one of her maids of honor, the daughter of Sir Nicholas Throckmorton. Although he made the best reparation in his power, by marrying that lady, he was imprisoned for some months, and banished the queen's presence. To discover the fabled El Dorado or region of gold he planned an expedition to Guiana, in which he embarked in 1595, and reached the Orinoco; but was obliged to return after having done little more than take a formal possession of the country in the name of Elizabeth. In 1596 he held a naval command against Spain under Lord Howard and the Earl of Essex, and assisted in the defeat of the Spanish fleet and the capture of Cadiz. Next year he captured Fayal in the Azores; in 1600 he became governor of Jersey. James I, on his accession in 1603, had his mind soon poisoned against Raleigh, whom he deprived of all his offices. Accused of complicity in Lord Cobham's treason in favor of Arabella Stuart, Raleigh was brought to trial at Winchester in November 1603, found guilty of treason, and sentenced to death. He was, however, reprieved and confined to the Tower. Here he remained for twelve years, devoting himself to scientific and literary work. In 1616 he obtained his release by bribing the favorite, Villiers, and by offering to open a mine of gold which he believed to exist near the Orinoco. The enterprise proved disastrous. Raleigh's force had attacked the Spaniards, and on his return James, to favor the Spanish court, with his usual meanness and pusillanimity determined to execute him on his former sentence. After a trial before a commission of the privy-council the doom of death was pronounced against him, and was carried into execution October 29, 1618. As a politician and public character Raleigh is doubtless open to much animadversion; but in extent of capacity and vigor of mind he had few equals, even in an age of great men. His writings are on a

variety of topics, besides a few poetical pieces of great merit. His *History of the World* is one of the best specimens of the English of his day, having at once the style of the statesman and the scholar.

Rallentando (ral-en-tan'dō), also RITARDANDO, or LENTANDO (Italian), in music, indicates that the time of the passage over which it is written is to be gradually retarded.

Rallidæ (ral'i-dē), the rail family of birds. See *Rail.*

Ram, a steam iron-clad ship-of-war, armed at the prow below the water-line with a heavy iron or steel beak intended to destroy an enemy's ships by the force with which it is driven against them. The beak is an independent adjunct of the ship, so that, in the event of a serious collision, it may be either buried in the opposing vessel or carried away, leaving uninjured the vessel to which it is attached. By naval experts the ram is considered an important element in the solution of the problem of coast defense.

Ram, BATTERING. See *Battering-ram.*

Ram, HYDRAULIC. See *Hydraulic Ram.*

Rama (rä'ma), in Hindu mythology, the name common to a personage appearing as three incarnations of Vishnu, all of surpassing beauty.

Ramadan (rä'ma-dan), RHAMAZAN, or RAMADZAN, the ninth month in the Mohammedan year, during which it is said Mohammed received his first revelation. It is devoted to fasting and abstinence. From sunrise to sunset for the thirty days of its duration the Mohammedans partake of no kind of nourishment. After sunset necessary wants may be satisfied, and this permission is liberally taken advantage of. Believers are exempted in peculiar circumstances from observing the fast. As the Mohammedans reckon by lunar time, the month begins each year eleven days earlier than in the preceding year, so that in thirty-three years it occurs successively in all the seasons.

Râmâyana (rä-mä'ya-nä), the older of the two great Sanskrit epics (see *Mahâbhârata*) ascribed to the poet Valmiki, and dating probably from the 5th century B. C. The hero is Rama, an incarnation of Vishnu, as the son of the King of Oudh. It relates his marriage with Sita, their wanderings in the forests, the seizure of Sita by the giants of Ceylon, her recovery, and the restoration of Rama to the throne of his ancestors. It contains 24,000 verses, and is divided into seven books. See *Sanskrit Language and Literature.*

Rambootan (ram-bö'tan), the fruit of the tree *Nephelium lappaceum*, nat. order Sapindaceæ, much prized in the Malayan Archipelago. It is about the size of a pigeon's egg, and of a red color. It is said to be rich and of a pleasant acid.

Rambouillet (rȧn-bö-yā), a town of France, department of Seine-et-Oise, in a beautiful valley near the extensive forest of same name, 27 miles southwest of Paris. It is remarkable only for its château, long the residence of the kings of France, and a fine park, in which the first model farm in France was established. Pop (1906) 3965.

Rambouillet (rȧn-bö-yā), CATHERINE DE VIVONNE, MARQUISE DE, born at Rome in 1588, died in 1665. In 1600, when only twelve years old, she married Charles d'Angennes, son of the Marquis de Rambouillet, to whose title and estates she succeeded on the death of the latter in 1611. Her residence at Paris, the Hôtel Rambouillet, for more than fifty years formed the center of a circle which exercised great influence on French language, literature, and civilization. Her circle is said to have suggested Molière's comedy of the *Précieuses Ridieules*, but this play was not so much directed against it as against the numerous ridiculous coteries which sprang up in imitation.

Rameau (rȧ-mō), JEAN PHILIPPE, a French musical writer, born at Dijon in 1683, died at Paris in 1764. He was appointed organist in Clermont Cathedral, and in 1722 printed a treatise, entitled *Traité de l'Harmonie*, followed by *Nouvelle Système de Musique*, etc. His fame as a theorist chiefly depends on his *Demonstration of the Principles of Harmony*, published in 1750. This work procured him an invitation from the court to superintend the opera at Paris. He was also the author of several operas, and a great variety of ballets, concertos, gavottes, songs, etc. Louis XV acknowledged his merits by the grant of a patent of nobility and the order of St. Michael.

Ramee. See *Ramie.*

Ramée (ra-mē), LOUISE DE LA (OUIDA), an English novelist of French extraction, born at Bury St. Edmunds in 1840. She published her first novel, *Held in Bondage*, in 1863, and was subsequently a very prolific writer. Among her best works are *Strathmore, Chandos, Puck, Moths, Princess Napraxine, A House Party, Gilderoy,*

etc. She died in Italy, where she had long resided, in 1910.

Ramée, PIERRE DE LA. See *Ramus.*

Rameses (ram'e-sēz), or RAMSES (in Egyptian, 'the Child of the Sun'), the name given to a number of Egyptian kings.— RAMESES I was the first king of the nineteenth dynasty, but in no way notable.— RAMESES II, grandson of the preceding, was the third king of the nineteenth dynasty, and was born in the quarter of a century preceding the year 1400 B. C. He is identified by many with the Sesostris of Greek writers. (See *Sesostris.*) His first achievement was the reduction of Ethiopia to subjection. He defeated a confederation, among whom the Khita or Hittites were the chief, in a great battle near the Orontes in Syria, and in a subsequent stage of the war took Jerusalem and other places. He was a zealous builder and a patron of art and science. He is supposed to have been the king who oppressed the Hebrews, and the father of the king under whom the exodus took place.— RAMESES III, the Rhampsinitus of Herodotus, belonged to the twentieth dynasty, and was uniformly successful in war. He endeavored to surpass his ancestors in the magnificence of his buildings.

Rameses, one of the treasure cities of Egypt built by the Hebrews during the oppression, and probably named after Rameses II. It has been identified by Lepsius with Tell-el-Maskhûta on the Fresh-water Canal (about 12 miles west of the Suez Canal), and by Brugsch with Tanis, the modern San.

Rameswaram (rä-mes'wu-rum), a low sandy island in the Gulf of Manaar, between the mainland of India and Ceylon. It is about 11 miles long and 6 broad, and contains one of the most venerated Hindu temples in India, the resort of thousands of pilgrims. Pop. 17,854.

Rámgarh (räm-gur'), a town of India, in Jaipur state, Rajputana. Pop. 11,313.

Ramie, RAMEE (ra-mē'), a name applied to various fiber-plants of the nettle family or to the fiber yielded by them. The chief of these are *Boehmeria nivea,* or China grass (also called *Urtīca nivea*) and *Boehmeria tenacissima* (or *U. tenacissima*), which some maintain to be the true ramie plant. (See *China Grass.*) A kind of ramie has also been prepared from a common European nettle (*Urtīca dioica*), and from *Laportea canadensis,* a North American nettle, introduced into Germany as a fiber plant.

Ramillies (rà-mi-yē), a village of Belgium, province of Brabant, 13 miles north of Namur, and 28 southeast of Brussels. On May 23, 1706, the Duke of Marlborough gained here a great victory over the French under Marshal Villeroi.

Ramists (ram'istz), the followers or disciples of Peter Ramus. See *Ramus.*

Rammohun Roy (räm'ō-hun), an Indian rajah, founder of the Brahmo-Somaj (which see) sect of theists; born at Burdwan, Bengal, in 1776; died near Bristol in 1833. His parents were Brahmans of high rank. He acquired a mastery of Sanskrit, Persian, Arabic, English, Latin, Greek, and Hebrew. A careful study of the sacred writings of the Hindus had convinced him that the original Hindu religion was theistic, and he became anxious to reform the creed and practice of his countrymen in this direction. From the perusal of the New Testament he found the doctrines of Christ more in harmony with his own opinions than any others which had come to his knowledge, and in 1820 he accordingly published a work entitled the *Precepts of Jesus the Guide to Peace and Happiness,* consisting chiefly of a selection of moral precepts from the Evangelists. Rammohun Roy, in his doctrinal views, was a Unitarian, or Arian, holding, however, the pre-existence and superangelic dignity of Christ. In 1833 he visited England as ambassador from the King of Delhi, and while there was seized with a fever, which proved fatal.

Rámnád (räm-näd'), a town of India, presidency of Madras, near the Gulf of Manaar. It has a fort, a palace, a Protestant and two Roman Catholic churches. Pop. 14,000.

Rámnagar (räm-nug'ur), a town of India, Benares district, Northwestern Provinces, about 2 miles above Benares city. It is a considerable commercial center, and the residence of the Maharajah of Benares. Pop. about 10,000.

Rampant (ram'pant), in heraldry, standing upright upon its hind-legs (properly on one foot) as if

Rampant.

Rampant gardant.

attacking; said of a beast of prey, as the lion. It differs from *salient*, which means in the posture of springing forward. *Rampant gardant* is the same as *rampant*, but with the animal looking full-faced. *Rampant regardant* is when the animal in a rampant position looks behind.

Rampart (ram'pårt), an elevation or mound of earth around a place, capable of resisting cannon-shot, and on which the parapet is raised. The rampart is built of the earth taken out of the ditch, though the lower part of the outer slope is usually constructed of masonry. The term in general usage includes the parapet itself.

Ramphastos (ram-fas'tus), the generic name of the toucans.

Rampion (ram'pi-un), *Campanŭla Rapuncŭlus*, a plant of the nat. order Campanulaceæ, or bellworts, indigenous to various parts of Europe. Its root may be eaten in a raw state like radish, and is by some esteemed for its pleasant nutty flavor. Both leaves and root may also be cut into winter salads.

Rámpur (räm-pör'), capital of a native state of the same name, Northwestern Provinces of India, on the left bank of the Kosila River, 18 miles E. of Moradabad. It is the residence of the nawab, and has manufactures of pottery, damask, sword-blades, and jewelry. Pop. 78,758.— The state, which is under the political superintendence of the government of the Northwestern Provinces, has an area of 945 square miles and a pop. of 533,000.

Rámpur Beauleah (be-a̤'le-ä), a town of India, capital of Rájsháhi district, Bengal, on the N. bank of the Ganges. It has a large traffic by river with the railway station of Kushtia on the opposite bank. Pop. 21,589.

Ramree (rum-rē), or RAMRI ISLAND, in the Bay of Bengal, off the coast of Burmah, is 40 miles long and 15 in breadth. Produces rice, indigo, sugar, petroleum, etc.

Ramsay (ram'zē), ALLAN, a Scottish poet, born in 1686, at Leadhills, in Lanarkshire; died at Edinburgh in 1758. His father, who was superintendent of Lord Hopetoun's mines, died when Allan was yet an infant. He removed to Edinburgh in his fifteenth year and was apprenticed to a wig maker, an occupation which he followed till his thirtieth year. His poems, most of them printed as broadsides, soon made him widely known among all classes, and he now abandoned wig making, and commenced business as a bookseller. He was the first to start a circulating library in Scotland. In 1720 he published a collection of his poems in one volume quarto. In 1724 the first volume of *The Tea-Table Miscellany, a Collection of Songs*, appeared. The rapid sale of this compilation induced Ramsay to publish another, entitled *The Evergreen, being a Collection of Scots Poems wrote by the Ingenious before 1600*, which was equally successful. His next publication established his fame upon a sure and lasting basis. This was *The Gentle Shepherd* (1725) — the best pastoral perhaps in any language. In 1728 a second quarto volume of his poems appeared; and in 1730 his *Thirty Fables*, which concluded his public poetical labors. He did not give up his shop until within three years of his decease. He rendered great service to the vernacular literature by editing and imitating the old Scottish poetry, but his fame rests chiefly on the inimitable *Gentle Shepherd*.— His son ALLAN, born 1709, died 1784, became famous as a portrait painter in London. In 1767 he was appointed principal painter to George III.

Ramsay, SIR ANDREW CROMBIE, geologist, born in Glasgow in 1814. He joined the Geological Survey in 1841; was appointed to the chair of geology at University College, London, 1848; was lecturer at the School of Mines 1851; president of the Geological Society 1862; director-general of the Geological Survey and of the Museum of Practical Geology from 1872 to 1881. He was the author of *Physical Geology and Geography of Britain*, etc. He died in 1891.

Ramsay, ANDREW MICHAEL, known as the Chevalier Ramsay, was born in Ayr in 1686, died at St. Germain-en-Laye in 1743. After spending some time at the Universities of Edinburgh and St. Andrews he went to Leyden. In 1710 he repaired to Cambray, where he was converted to the Roman Catholic faith by Fénelon. He procured the preceptorship to the Duke of Château-Thierry and the Prince of Turenne, and was afterwards engaged to superintend the education of Prince Charles Edward Stuart and his brother Henry, afterwards Cardinal York. He acquired distinction by his writings, which are chiefly in French. The chief of these are a *Life of Viscount Turenne*, a *Life of Fénelon*, the *Travels of Cyrus*, a romance, and a large work on the *Principles of Natural and Revealed Religion.*

Ramsay, DAVID, an American patriot and historian, born in Penn-

sylvania in 1749; died at Charleston in 1815. He served as surgeon during the Revolutionary war, was a delegate to the Continental Congress in 1782–86, and president of the South Carolina Senate for seven years. He was shot by a lunatic. Chief works: *History of the Revolution in South Carolina*, *History of the American Revolution*, *History of the United States*, etc.

Ramsay, Edward Bannerman, son of Alexander Burnett, advocate, born at Aberdeen in 1793; died at Edinburgh in 1876. He adopted the name of his grand-uncle, Sir Alex. Ramsay, by whom he was educated. Educated at Cambridge he took holy orders, and came to Edinburgh in 1823 as a clergyman of the Scottish Episcopal Church, becoming dean of the diocese in 1846. He is best known by his *Reminiseenees of Scottish Life and Character*, which had a great popularity.

Ramsay, Sir William, chemist, was born at Glasgow, Scotland, Oct. 2, 1852. He graduated at the Universities of Glasgow and Tübingen, and became Professor of Chemistry at University College, London. The new atmospheric element argon was discovered by him in association with Lord Rayleigh, and he added to this the elements neon, krypton, and zenon. He was knighted in 1902, and is considered one of the ablest chemists of the day.

Ramsden (ramz'den), Jesse, optician and philosophical instrument maker, born at Halifax, Yorkshire, in 1735; died at Brighton in 1800. He married a daughter of Dollond, the celebrated optician, and acquired a share of his father-in-law's patents. He gained great celebrity for his divided circles and transit instruments, and effected vast improvements in the construction of other instruments. He was chosen a fellow of the Royal Society in 1786, and of the Imperial Academy of St. Petersburg in 1794, and such was his reputation that he received orders for his instruments from every part of Europe.

Ramsey (ram'zi), a seaport on the northeast coast of the Isle of Man, 14 miles N. N. E. of Douglas. The attractive scenery, fine sands, promenade, and pier make it a favorite resort of tourists and pleasure-seekers. Pop. about 4729.

Ramsgate (ramz'gāt), a seaport and watering-place of England, county of Kent, in the Isle of Thanet, 67 miles east by south of London. The older parts occupy a natural hollow or valley in the chalk cliffs that line this part of the coast, while the newer portions occupy the higher ground on either side. It is a well-built town, possesses a fine stretch of sand and a promenade pier, and is much frequented by visitors. The harbor, which serves as a harbor of refuge for the Downs, is nearly circular, comprises an area of about 50 acres, and includes a dry dock and a patent slip for the repair of vessels. It is protected by two stone piers 3000 and 1500 feet long, with an entrance of 240 feet. Shipbuilding and rope-making are carried on; there is some trade in coal and timber, and a considerable fishery. Ramsgate was formerly a member of the Cinque Ports, and attached to Sandwich; it is now a separate municipal borough. Pop. (1911) 29,605.

Ramson (ram'sun), *Allium ursīnum*, a species of garlic found wild in many parts of Britain, and formerly cultivated in gardens.

Ramtek (räm'tek), a town of India, Nagpur district, Central Provinces, 24 miles N. of Nagpur city, celebrated as a holy place, and the resort of great numbers of pilgrims. Pop. 7814.

Ramtil Oil (ram'til), a bland oil similar to sesamum oil, expressed from the seeds of a composite annual herb, *Guizotia oleifera*, cultivated in Abyssinia and various parts of India.

Ramus (rā-mus), Peter, or Pierre de la Ramée, a French logician and classical scholar, born in Vermandois in 1515; killed in the massacre of St. Bartholomew in 1572. He went to Paris about 1523, and studied under great difficulties. He attacked Aristotle and the scholastics, and excited violent opposition. In 1551 he was appointed royal professor of rhetoric and philosophy at Paris. In 1561 he became a Protestant. He published a *Treatise on Logie* in 1543, which obtained great success, as did also his other works on grammar, mathematics, philosophy, theology, etc. His doctrines were widely diffused. France, England, and particularly Scotland were full of Ramists. His logic was introduced into the University of Glasgow by Andrew Melville, and made considerable progress in the German universities.

Rana. See *Frog*.

Rancé (rāṇ-sā), Armand Jean le Bouthillier de, the founder of the reformed order of La Trappe, born at Paris in 1626; died in 1700. He embraced the ecclesiastical profession, and held no fewer than six benefices. Residing at Paris, he gave himself up to a life of dissipation. In 1657, however, a marked change took place in his character. He demitted all his benefices ex-

cept the priory of Boulogne and the abbey of La Trappe. Retiring to the latter place in 1664, he began those reforms which have rendered his name famous. (See *La Trappe.*)

Ranch, a large farming area for the rearing of cattle and horses. The word is derived from the Spanish, rancho, meaning mess-room, but used in Mexico for a herdsman's hut and finally for a grazing farm. The business of ranching has long been pursued in the thinly-settled region of the United States from the Mississippi westward, especially in Texas and the great plains of the West. The advance of the farming population is narrowing the ranching country, and threatens eventually to bring the ranching business to an end, farm animals replacing those of the ranch.

Rand, THE, or WHITE WATERS RANGE, the name given the gold mining trail of the Transvaal region, extending 25 miles on each side of Johannesburg, South Africa. The yield of gold here has developed until now it surpasses any other mining region of the earth.

Randall (ran'dal), SAMUEL J., statesman, born in Philadelphia, Pennsylvania, in 1828. In 1862 he was elected to Congress, serving continuously until his death. He was speaker of the House from 1876 to 1881. As such he used his influence in guiding the House through the dangerous crisis produced by the uncertainty of the Presidential election of 1876. He died in 1890.

Randolph (ran'dolf), EDMUND JENNINGS, statesman, born at Williamsburg, Virginia, Aug. 10. 1753. He studied at William and Mary College and was admitted to the bar, becoming in 1775 the first Attorney General of Virginia. He helped to frame the constitution of Virginia, was its governor 1786–88, and in 1787 a member of the convention that framed the Constitution of the United States. He entered Washington's Cabinet as Attorney General in 1789, and become Secretary of State in 1794. He died Sept. 13, 1813.

Randolph, JOHN, statesman, 'of Roanoke,' born in Cawsons, Virginia, in 1773. As member of Congress he was preëminent for his poetic eloquence, his absolute honesty, and the scathing wit with which he exposed every corrupt scheme. He died in 1833.

Range (rānj), in gunnery, the horizontal distance to which a shot or other projectile is carried. When a cannon lies horizontally it is called the point-blank range; when the muzzle is elevated to 45 degrees it is called the utmost range. To this may be added the ricochet, the skipping or bounding shot, with the piece elevated from 3 to 6 degrees.

Ranger (rān'jer), in England, formerly a sworn officer of a forest, appointed by the king's letters patent, whose business was to watch the deer, prevent trespasses, etc.; but now merely a government official connected with a royal forest or park. The word generally signifies a mounted soldier employed on foraging or exploring expeditions, or a forest keeper.

Range Finder, an instrument for locating the position — direction and distance — of a moving object, as a hostile war-vessel. Large guns, with an effective range of several miles, are often placed behind an embankment, and the gunners need some means of determining quickly and accurately the position of a vessel or other object which is to be fired at. A system of triangulation is used, telescopes being placed on each side of the gun, the distance between them forming the base-line of the triangle and the angles found with it and the object yielding the length and direction of the other lines. Very accurate information is attainable by these instruments and by their aid the waste of projectiles is largely obviated.

Rangoon (rän-gön'), the capital of Lower Burmah, and the chief seaport of Burmah, is situated at the junction of the Pegu, Hlaing or Rangoon, and Pu-zun-doung rivers, about 21 miles from the sea. Since its occu-

pancy by the British in 1852 Rangoon has undergone such changes that it is practically a new town, and its population has increased fivefold. The principal streets are broad, and contain many large and not a few handsome buildings. There are the law-courts, post offices, Bank of Bengal, custom-house, Anglican and Roman Catholic churches, St. John's College, high-school, etc. A large and increasing commerce is carried on with British, Indian, and Chinese ports; and an extensive trade is conducted with inland towns as far as Mandalay. The chief exports are rice, timber, cotton, hides, gums and resins, mineral oil, ivory, precious stones; the imports being mainly manufactured goods. A number of rice-mills have been erected; there is a government dockyard, and steam tram-cars have been introduced. Pop. 234,881.— The district of RANGOON produces rice, cotton, catechu, gambier, etc.; has an area of 4236 sq. miles, and pop. of 780,000.

Rangpur (rung-pör'), a district in the Rajshahi division of Bengal; area, 3486 sq. miles. This territory is flat and well-watered, the chief product being rice. RANGPUR, the capital, is situated on the Ghaghât river, 270 miles N. E. of Calcutta. Pop. about 15,000.

Raniganj (rä-nē-gunj'), a town of India, in Bardwân district of Bengal, on the north bank of the Dámodar river, 120 miles N. W. of Calcutta. It is notable chiefly for its bituminous coal, the seams of which are of great thickness. Pop. about 15,000.

Rank, a line of soldiers standing abreast or side by side: often used along with *file*, which is a line running from the front to the rear of a company, battalion, or regiment, the term *rank and file* thus comprising the whole body of the common soldiers.

Ranke (rån'kė), LEOPOLD VON, a German historian, born in 1795. He studied at Halle and Berlin, became a teacher in the gymnasium of Frankfurt-on-the-Oder in 1818, and professor of history at the University of Berlin in 1825. His first published work (1824) was a *History of the Romance and Teutonic Nations from 1494 to 1535.* This was followed by *Princes and Peoples of Southern Europe in the 16th and 17th Centuries* (1827), *The Servian Revolution* (1829), *History of the Popes* (1834–37), *History of Germany in the time of the Reformation* (1839–47), *History of Prussia during the 17th and 18th centuries* (1847–48), *History of France, chiefly in the 16th and 17th centuries* (1852–55), *History of England in the 17th century* (1859–68), besides a number of smaller works supplementary of his *History of Germany.* At the age of eighty he undertook with undiminished vigor to write a *World-history*, and a volume of this great work appeared every year until his death. His writings are chiefly valuable for the new material which he discovered in state papers, and the truth with which he presented history unbiased by personal predilections. Many of his works have been translated into English. He died May 23, 1886.

Rankin, a borough in Allegheny Co., Pennsylvania, in the vicinity of Braddock. It has steel, wire, chain, and bridge works. Pop. 6042.

Rankine (rank'in), WILLIAM JOHN MACQUORN, civil engineer, born at Edinburgh in 1820; died in 1872. He received his instruction in natural philosophy from Professor Forbes, his practical training as an engineer from Sir J. Macneill, and he became himself professor of engineering at Glasgow University in 1855. His numerous contributions to the technical journals have been reprinted (London, 1881), and he was the author of text-books on *Civil Engineering, The Steam Engine, Applied Mechanics, Shipbuilding*, etc. He was especially successful in investigating mathematically the principles of mechanical and civil engineering. He was also well known as a song writer.

Ransom (ran'sum), the money or price paid for the redemption of a prisoner, captive, or slave, or for goods captured by an enemy, and formerly a sum paid for prisoners of war.

Ranters (ran'terz), a name given by way of reproach to a denomination of Christians which sprang up in 1645. They called themselves *Seekers*, the members maintaining that they were seeking for the true church and its ordinances, and the Scriptures, which were lost. The name *Ranters* is also vulgarly applied to the Primitive Methodists, who formed themselves into a society in 1810, and who were in favor of street preaching, camp-meetings for religious purposes, as also of females being permitted to preach.

Ranunculaceæ (ra-nun-kū-lā'se-ē), a nat. order of exogenous polypetalous plants, in almost all cases herbaceous, inhabiting the colder parts of the world, and unknown in hot countries except at considerable elevations. They have radical or alternate leaves (opposite in Clematis), regular or irregular, often large and handsome flowers, and fruits consisting of one-seeded achenes or many-seeded follicles.

There are about 30 genera and 500 species. They have usually poisonous qualities, as evinced by aconite and hellebore in particular. Some of them are objects of beauty, as the larkspurs, ranunculus, anemone, and pæony. See next article.

Ranunculus (ra-nun'kū-lus), a genus of herbaceous plants, the type of the nat. order Ranunculaceæ. They have entire, lobed, or compound leaves, and usually panicled, white or yellow flowers. The species are numerous, and almost exclusively inhabit the northern hemisphere. Almost all the species are acrid and caustic, and poisonous when taken internally, and, when externally applied, will raise blisters. The various species found in the United States are known chiefly by the common names of crowfoot, buttercup, and spearwort. *R. flammŭla* and *scelerātus* produce a blister on the skin in about an hour and a half. Beggars use them for the purpose of forming artificial ulcers to excite the compassion of the public. *R. Ficaria* is the lesser celandine. *R. aquatĭlis* is the water crowfoot, a nutritive food for cattle.

Ranz-des-vaches (rȧnz-dā-vȧsh,) the name of certain simple melodies of the Swiss mountaineers, commonly played on a long trumpet called the *alpenhorn*. They consist of a few simple intervals, and have a beautiful effect in the echoes of the mountains.

Raoul Rochette. See *Rochette (Desiré Raoul)*.

Rapallo (rȧ-päl'lō), a town of Italy, province of Genoa, on a small bay 18 miles E. S. E. of Genoa. It is a winter residence for persons in delicate health. Pop. 5839.

Rape (rāp), the carnal knowledge of a woman forcibly and against her will. By the English law this crime is felony, and is punishable with penal servitude for life. In the United States the crime is treated as a felony, and the punishment is imprisonment for life or a term of years.

Rape, a division of the county of Sussex, an intermediate division between a hundred and a shire, and containing three or four hundreds. The like parts in other countries are called tithings, lathes, or wapentakes.

Rape (*Brassica Napus*), a plant of the cabbage family, cultivated in Europe and India for its seeds, from which oil is extracted by grinding and pressure. It is also cultivated in England for the succulent food which its thick and fleshy stem and leaves supply to sheep when other fodder is scarce. The oil obtained from the seed, which is much the same as colza oil, is used for various economical purposes, as for burning in lamps, for lubricating machinery, in medicine, etc. The oil-cake is used as food for sheep and cattle, and as a fertilizer. See next article.

Rape-cake, a hard cake formed of the residue of the seed and husks of rape after the oil has been expressed. This is used for feeding oxen and sheep, but it is inferior to linseed cake and some other kinds of oil-cakes; it is also used as a rich manure, and for this purpose it is imported into Britain in large quantities. See *Rape*.

Raphael (rā'fa-el, raf'a-el; or RAFFAELLO) SANZIO or SANTI, one of the greatest painters that ever lived, was born at Urbino, April 6, 1483. His father, Giovanni Sanzio, a painter of some merit, from whom young Raphael received his first instruction, died in 1494, and he was then intrusted to the care of an uncle. His studies, however, were not interrupted, and at the early age of twelve he was received into the studio of Perugino at Perugia as one of his pupils, and continued with that celebrated painter for six or eight years. The pupil was soon permitted to share in the

Raphael Sanzio.

master's work, and when he came to paint independently he was seen to have acquired Perugino's manner. About this time the painting of the library of the cathedral at Siena was intrusted to Pinturicchio, a fellow-pupil, and Raphael is said to have assisted in the work. In 1504 he visited his native town, and while there painted *Christ Praying on the Mount of Olives*, a *St. Michael*, and a *St. George*, the last two of which are

RAPHAEL'S SISTINE MADONNA

now in the Louvre. Towards the end of the same year he proceeded to Florence, attracted thither by the fame of its numerous artists, and in this center of the highest artistic life of the time he studied diligently over a period of four years, with short intervals of return to his native city. In Florence he rapidly gained a wider knowledge of his art, and soon began to forsake the manner which he had adopted from Perugino. The sources from which he sought and obtained the artistic knowledge which enabled him to develop his new style were various. From Michael Angelo he learned simplicity and strength of outline, from Leonardo da Vinci he acquired grace of expression and composition, while from Fra Bartolommeo he gained a subtler depth of coloring, and from Masaccio a broader treatment of drapery and dramatic effects. During the last two years of his stay in Florence he painted, in what is known as his Florentine manner, many of what are now considered his most important works. Of such may be mentioned the *Madonna del Gran Duca* (Florence); *Madonna del Giardino* (Vienna); *Holy Family* (Madrid); *Christ Bearing the Cross* (Madrid); *Marriage of Joseph and the Virgin* (Brera, Milan); the *Ansidei Madonna* (National Gallery); *Madonna* (belonging to Lord Cowper); *Tempi Madonna* (Munich); and the *Bridgewater Madonna* (Bridgewater House). About this time Pope Julius II had employed Bramante in rebuilding St. Peter's and in embellishing the Vatican, in which work Raphael was invited to assist. Here he executed the *Disputa*, or *Dispute of the Fathers of the Church*, on the wall of the second chamber, called the *stanza della Segnatura*, next to the great hall of Constantine. In this painting we recognize the transition to his third manner, which is still more clearly manifested in the *School of Athens*, the second painting in this chamber. Besides these he painted as Vatican frescoes (1508–11) the allegorical figures of *Theology*, *Philosophy*, *Justice*, and *Poetry*, in the corners of the ceiling; the *Fall of Adam*, *Astronomy*, *Apollo and Marsyas*, and *Solomon's Judgment*, all having reference to the four principal figures of the apartment; and, lastly, on the fourth wall, over the windows, *Prudence*, *Temperance*, and *Fortitude;* below them the *Emperor Justinian Delivering the Roman Law to Tribonian*, and *Gregory X Giving the Decretals to an Advocate*, and under them *Moses* and an armed allegorical figure. After the accession of the new pope, Leo X, Raphael painted, in the *stanza d'Eliodoro*, his *Leo the Great Stopping the Progress of Attila*, the *Deliverance of Peter from Prison*, and, on the ceiling, *Moses Viewing the Burning Bush*, the *Building of the Ark*, the *Sacrifice of Isaac*, and *Jacob's Dream*. With the *Conflagration of the Borgo Extinguished by the Prayers of Leo*, Raphael began the third *stanza* of the Vatican. It was followed by the *Coronation of Charlemagne*, *Leo III's Vindication of Himself before Charlemagne*, and the *Victory of Leo IV* over the Saracens at Ostia. During this time Raphael prepared designs for several palaces in Rome and other cities of Italy (notable among which were the series of designs in the Villa Farnesina to illustrate the story of *Cupid and Psyche*), finished the Madonna for the church of St. Sixtus in Piacenza (now in Dresden), and painted the portraits of *Beatrice of Ferrara*, of the *Fornarina*, of *Carondelet* (now in England), and of *Count Castiglione*. It was probably at a later period that Raphael prepared for Augustino Ghigi designs for the building and decoration of a chapel in Sta. Maria del Popolo and for Leo X the celebrated cartoons for the tapestry of one of the chambers of the Vatican. Seven of these cartoons are now in the South Kensington Museum. To this period also belong his easel-pieces of *John in the Desert* (of which there exist several copies); his *Madonna and Child*, on whom an angel is strewing flowers; a *St. Margaret* (Louvre); the *Madonna della Seggiola* (Florence), and *St. Cecilia* (Bologna). Raphael's last and unfinished painting — the *Transfiguration of Christ* — is in the Vatican. Attacked by a violent fever, which was increased by improper treatment, this great artist died at the age of thirty-seven years, and was buried with great pomp in the Pantheon. His tomb is indicated by his bust, executed by Naldini, and placed there by Carlo Maratti. His biography has been written by Vasari, Fuseli, Quatremère de Quincy, Passavant, Crowe and Cavalcaselle, and by many others. He died at Rome, April 6, 1520.

Raphania (ra-fā′ni-a), a disease attended with spasm of the joints, trembling, etc., not uncommon in Germany and Sweden, and said to arise from eating the seeds of *Raphănus Raphanistrum*, or field radish, which often get mixed up with corn.

Raphănus. See *Radish.*

Raphe (rā′fe), in botany, the vascular cord communicating between the nucleus of an ovule and the

placenta, when the base of the former is removed from the base of the ovulum.

Raphia (rā′fi-a), a genus of palms, rather low trees with immense leaves, inhabiting swampy coasts. *R. viniferа*, a native of W. Africa, Madagascar, Polynesia, etc., besides yielding palm-wine, supplies materials for the roofs and other parts of houses, for basket and other works, etc. The *R. tædigĕra* is equally useful; and the *R.* or *Sagus Ruffia*, a palm of Madagascar, yields sago. The fiber of these palms is known in Europe as *raphia* or *raffia*, and is used for matting, for tying up plants, etc. See also *Jupati Palm*.

Raphides (raf′i-dēz), a term applied to all crystalline formations occurring in plant cells. They consist of oxalate, carbonate, sulphate, or phosphate of lime.

Rapid-Fire Gun, a cannon distinguished from a machine-gun by the fact that the former is loaded by hand, and may be fired by hand or machinery. Generally it is of larger caliber and has but one barrel, while the machine-gun may have more. The Hotchkiss varies in caliber from the 1-pounder 1.46 in., to the 100-pounder 6.10 in. The Driggs-Schroeder was invented in the United States and is very effective. The Nordenfeldt is another type. The Maxim is a semi-automatic gun, *i. e.*, after the first fire all the operations are performed by the gun itself, except the insertion of the cartridge by hand. Other notable types are the Armstrong, Canet, Gruson and Krupp. The caliber of rapid fire guns has been increased until the vessels of the United States navy are equipped with guns of this type of 4, 5, and 6 in. bore. See *Cannon*, *Machine-Gun*, etc.

Rapier (rā′pi-ėr), a light, highly-tempered, edgeless and finely-pointed weapon of the sword kind used for thrusting. It is about 3 feet in length, and was long a favorite weapon for duels. Its use now, however, is restricted to occasions of state ceremonial.

Rapp, GEORGE. See *Harmonists*.

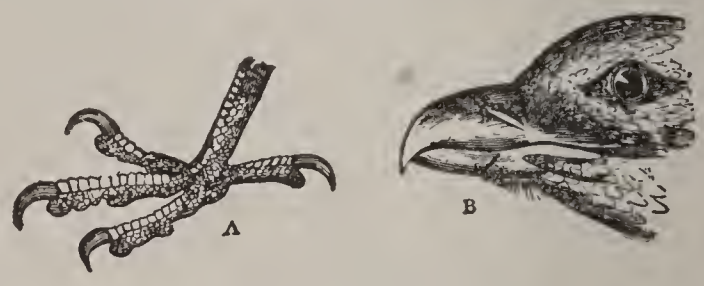
Rapp (rap), JEAN, COUNT, a French general, was born at Colmar in 1772, and in 1788 entered the military service. On the breaking out of the war against Austria, in 1805, he accompanied Napoleon as aide-de-camp at the battle of Austerlitz. He died in 1821.

Rappahannock (rap-a-han′nok), a river of Virginia, which rises in the Blue Ridge, runs E. S. E. about 130 miles, and flows into Chesapeake Bay. It passes the towns of Falmouth, Fredericksburg, Port Royal, and Leeds, and is navigable to Fredericksburg, 110 miles.

Rappee (ra-pē′), a strong kind of snuff, of either a black or a brown color, made from the ranker and darker kind of tobacco leaves.

Rappoltsweiler (rap′olts-vī-lėr), a town of Germany, in Upper Alsace, at the foot of the Vosges Mountains. Pop. 6098.

Raptores (rap-tō′rēz), birds of prey, an order of birds, also called *Accipitres*, including those which live on other birds and animals, and are characterized by a strong, curved, sharp-



RAPTORES.
A. Foot of Peregrine Falcon. B. Head of Buzzard.

edged, and sharp-pointed beak, and robust short legs, with three toes before and one behind, armed with long, strong, and crooked talons. The eagles, vultures, falcons, and owls are examples.

Raratonga (rå-rå-ton′ga), or RAROTONGA, an island in the South Pacific Ocean, belonging to the group of the Hervey Islands. It is about 30 miles in circuit, and consisting of a mass of mountains, becomes visible at a great distance, and has a very romantic appearance. The inhabitants, about 4000, have been converted to Christianity.

Raritan (rar′i-tan), a river of New Jersey, formed by two branches which unitedly flow S. E., and fall into Raritan Bay near Perth Amboy. It is navigable as far as New Brunswick.

Ras, an Arabic word signifying 'head,' prefixed to the names of promontories or capes on the Arabian and African coasts.

Rasgrad (räz′grat), a town of Bulgaria, 34 miles southeast of Rustchuk. Pop. 13,871.

Rash, an eruption of red patches on the skin, diffused irregularly over the body. The eruption is usually accompanied with a general disorder of the constitution, and terminates in a few days.

Rashi (rash′i), properly RABBI SALOMON-BEN-ISAAK, a great Jewish rabbi, born at Troyes, France, in 1040;

died in 1105. His first instructor in Talmudic literature was his father, who was chief rabbi at Worms. To perfect his knowledge he made extensive journeys through Italy, Greece, Palestine, Egypt, Persia, and Germany, where he was particular in visiting the towns which possessed learned Jewish schools. His most famous work is a *Commentary on the Pentateuch;* he also wrote commentaries on the Prophets, the Talmud, and various treatises on miscellaneous subjects.

Rasht. See *Resht.*

Rask, Rasmus Christian, a Danish philologist, born in 1787; died in 1832. After he had studied at the University of Copenhagen he journeyed through Sweden, Russia, and Iceland to increase his knowledge of northern languages, with the result that he published *An Introduction to the Knowledge of the Icelandic or Old Norse Tongue* (1811); an edition of Haldorsen's Icelandic Dictionary (1817); and an *Anglo-Saxon Grammar* (1817). In 1817-22 he made, at the expense of the government, a second journey to Russia, Persia, and India. He then returned to Copenhagen in 1822, was appointed professor of literary history and subsequently professor of oriental languages and librarian to the university. During this period he published a *Spanish Grammar*, a work on the Frisian language, and a treatise on the *Zendavesta*, in which he showed that the language was closely akin to Sanskrit.

Raskolniks (ras-kol'niks; Russian, *Raskolniki*, from *raskol*, schism), the collective name given to the adherents of the dissenting sects in Russia, which have originated by secession from the state church. The great majority of these sects date originally from the middle of the seventh century, when the liturgical books, etc., were revised under the patriarch Nikon. The Raskolniks clung fanatically to the old and corrupted texts, and regarding the czar and the patriarch as the representatives of Antichrist, called themselves *Staro-obryadtsy* (old ritualists) or *Starovertsy* (followers of the old faith). They have split up into a large number of sects, which may be grouped generally in two classes; those who have a priesthood, and those who have none. The tendency of the Raskolniks is communistic; and they have done much to spread Russian influence by advancing colonies on the outskirts of the empire. They have undergone much persecution at the hands of the government, but are now generally unmolested. They include about one-third of the merchant class, and nearly all the Cossacks, but none of the noble or cultivated class. Their numbers are variously estimated at from 3 to 11 millions; the last number is perhaps not far from the truth.

Rasores (r a - s ō′ r ē z), gallinaceous birds or scratchers, an order of birds comprising the suborders Gallinacei, or fowls, turkeys, partridges, grouse, etc., and the Columbacei, or pigeons which are often made a distinct order. The common domestic fowl may be regarded as the type of the order. They are characterized by the toes terminating in strong claws, for scratching up seeds, etc., and by the upper mandible being vaulted, with the nostrils pierced in a membranous space at its base, and covered by a cartilaginous scale. The rasorial birds are, as a rule, polygamous in habits; the pigeons, however, present an exception to this rule, and their young are also produced featherless and helpless.

Rasp, a coarse species of file, but having, instead of chisel-cut teeth, its surface dotted with separate protruding teeth, formed by the indentations of a pointed punch.

Raspail (rås - pây). François Vincent, a French naturalist, born in 1794; died in 1878. He settled in Paris in 1815, where he became known as a scientific writer by his *Nouveau Système de Chimie Organique* (1833), *Nouveau Système de Physiologie Végétale et Botanique* (1837), and *Histoire Naturelle de la Santé et de la Maladie chez les Végétaux et chez les Animaux* (1843). He also edited various newspapers, and was prominent in all the French revolutionary movements.

Raspberry (raz′bėr-i), the fruit of the well-known shrubby plant *Rubus Idæus*, natural order Rosaceæ, and the plant itself, which is of the same genus as the bramble or blackberry, dewberry, and cloudberry. It is a native of Britain and most of Europe as well as Asia. Species are also found in America. Several varieties are cultivated, either red, flesh-colored, or yellow. Raspberries are much used in cookery and confectionery, and the juice, mixed with a certain portion of sugar and brandy, constitutes the liquor called *raspberry brandy. Raspberry vinegar*, a refreshing summer beverage and cooling drink for invalids, is composed of raspberry juice, vinegar, and sugar.

Rasse (ras; *Viverra Malaceensis*), a carnivorous quadruped, closely allied to the civet, spread over a great extent of Asia, including Java, various

parts of India, Singapore, Nepâl, and other localities. Its perfume, which is secreted in a double pouch like that of the civet, is much valued by the Javanese. For its sake the animal is often kept in captivity. It is savage and irritable, and when provoked can inflict a very severe bite.

Rastadt (rä'stat), or RASTATT, a town in the grand-duchy of Baden, on the river Murg, about 15 miles southwest from Carlsruhe. Its only notable building is the old castle of the Margraves of Baden, and it derives its chief modern importance from being a strong fortress commanding the Black Forest. Pop. (1905) 14,404.

Rat, one of the rodent mammalia, forming a typical example of the family Muridæ or mice. The best known species are the (so-called) Norway or brown rat (*Mus decumānus*), and the true English or black rat (*Mus rattus*). The brown rat grows to about 9 inches in length, has a shorter tail than the other, small ears, is of a brownish color above and white below, and is altogether a much larger and stronger animal. Supposed to have belonged originally to India and China, it became known in Europe only about the middle of the 18th century; but it is now found in almost every part of the habitable globe, and where it has found a footing the black rat has disappeared. It is a voracious omnivorous animal, swims readily in water, breeds four or five times in the year, each brood numbering about a dozen, and these again breed in about six months. The black rat is usually about 7 inches in length, has a sharper head than the other, larger ears, and a much longer tail. It is much less numerous than the brown rat and more timid. To this *Mus rattus* variety belongs the white rat, which is sometimes kept as a household pet. Various other animals are called rats. The rat is now believed to disseminate the germ of the bubonic plague, and great numbers have been killed in places where this disease has appeared. See *Kangaroo-rat*, *Mole-rat*, *Musk-rat*, and *Vole*.

Rata (ra'ta), a New Zealand tree. See *Metrosideros*.

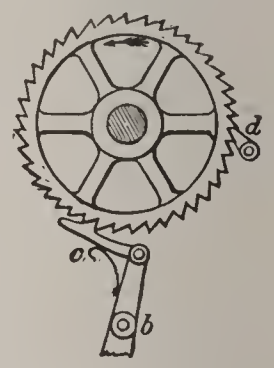
Ratafia (rat-a-fē'a), a fine spirituous liquor flavored with the kernels of several kinds of fruits, particularly of cherries, apricots, and peaches. *Ratafia*, in France, is the generic name of liquors compounded with alcohol, sugar, and the odoriferous and flavoring principles of plants.

Ratan'. See *Rattan Canes*.

Ratany (rat'a-ni; *Krameria triandra*), a shrubby plant found in Peru and Bolivia, having an excessively astringent root. It is sometimes used as an astringent medicine in passing bloody or mucous discharges, weakness of the digestive organs, and even in putrid fevers. It has silver-gray foliage and pretty red starlike flowers. Written also *Rhatany*.

Ratchet (rach'et), an arm or piece of mechanism one extremity of which abuts against the teeth of a ratchet-wheel; called also a *click*, *pawl*, or *detent*. If employed to move the wheel it is called a *pallet*. See next article.

Ratchet-wheel, a wheel with pointed and angular teeth, against which a ratchet abuts, used either for converting a reciprocating into a rotary motion on the shaft to which it is fixed, or for admitting of circular motion in one direction only, as in a winch, a capstan, etc. For both purposes an arrangement is employed similar to that shown in the figure, in which *a* is the ratchet-wheel, *b* a reciprocating lever, to the end of which is joined the small ratchet or pallet *c*. This ratchet, when the lever is moved in one direction, slides over the teeth, but in returning draws the wheel with it. The other ratchet *d* permits of the motion of the wheel in the direction of the arrow, but opposes its movement in the other direction.



Ratchet-wheel.

Ratel (rā'tel), or HONEY-BADGER, a carnivorous quadruped of the genus *Mellivŏra*, and of the badger family, found chiefly in South and East Africa, and in India. The Cape or South

Honey-ratel (*Mellivŏra ratel*).

African ratel (*M. ratel*) averages about 3 feet in length, including the tail, which measures 8 or 9 inches in length. The fur is thick and coarse, the color is black

on the under parts, on the muzzle, and limbs, while the tail, upper surface, sides, and neck are of grayish hue. It is celebrated for the destruction it makes among the nests of the wild bee, to the honey of which it is very partial.

Rathenow, or RATHENAU (rä'te-nou), a town of Prussia, province of Brandenburg, about 44 miles W. and by N. of Berlin, on the Havel. It has a church of the 14th and 16th centuries, and various manufactures, especially of optical instruments, wooden wares, machinery, etc. Pop. 23,095.

Rathkeale (rath-kēl'), a market town of Ireland, in the county of Limerick, on the Deel, about 19 miles southwest of Limerick. Pop. 2549.

Rathlin (rath'lin), or RACHLIN, an island of Ireland, belonging to the county of Antrim, 5 miles N. of Ballycastle. On it are the remains of a castle in which Robert Bruce took refuge when driven from Scotland in 1306. The island is about 6½ miles long by 1½ broad.

Ratibor (rä'tē-bōr), a town of Prussia, in the government and 40 miles S. S. E. of Oppeln, on the left bank of the Oder, about 10 miles from the Austrian frontier. It has a gymnasium and deaf and dumb institute, etc.; and manufactures of machinery and other iron goods, sugar, paper, glass, tobacco, etc. Pop. (1905) 32,690.

Ratification (rat-i-fi-kā'shun), in law, the confirmation or approval given by a person arrived at majority to acts done by him during minority, and which has the effect of establishing the validity of the act which would otherwise have been voidable.

Ratio (rā'shi-ō), the numerical measure which one quantity bears to another of the same kind, expressed by the number found by dividing the one by the other. The ratio of one quantity to another is by some mathematicians regarded as the quotient obtained by dividing the second quantity by the first; by others, as the quotient obtained by dividing the first by the second; thus the ratio of 2 to 4 or a to b may be called either $\frac{2}{4}$ and $\frac{a}{b}$ or $\frac{4}{2}$ and $\frac{b}{a}$. Proportion, in the mathematical sense, has to do with the comparison of ratios, proportion being the equality or similarity of ratios. Ratio in the above sense is sometimes called *geometrical ratio*, in opposition to *arithmetical ratio*, or the difference between two quantities. Ratio is of various kinds: *Compound ratio.* When the one quantity is connected with two others in such a manner that if the first be increased or diminished the product of the other two is increased or diminished in the same proportion, then the first quantity is said to be in the *compound ratio* of the other two.— *Direct ratio.* When two quantities or magnitudes have a certain ratio to each other, and are at the same time subject to increase or diminution, if while one increases the other increases in the same ratio, or if while one diminishes the other diminishes in the same ratio, the proportions or comparisons of ratios remain unaltered, and those quantities or magnitudes are said to be in a *direct ratio* or proportion to each other.— *Inverse ratio.* When two quantities or magnitudes are such that when one increases the other necessarily diminishes, and vice versa when the one diminishes the other increases, the ratio or proportion is said to be *inverse.*

Ration (rā'shun), in the army and navy, the allowance of provisions given to each officer, non-commissioned officer, private, and sailor.

Rationalism (rash'un-al-izm), the doctrine which affirms the prerogative and right of reason to decide on all matters of faith and morals whatever so-called 'authority' may have to say on the matter. Rationalism has had perhaps its chief center and widest success in Germany; but its source may fitly be found in the English deism of the seventeenth and eighteenth centuries. The first step taken by the English deists was to attempt to eliminate from the doctrines of Christianity whatever is above the comprehension of human reason; their next step was to discard from Christianity whatever in the way of fact was such as could not be verified by any man's experience, and this led to an attempt to get rid of Christianity altogether. German rationalism was also influenced by the writings of Voltaire, the Encyclopedists, and the skeptical freedom of thought which obtained among the French *savants* at the court (1740-86) of Frederick the Great. It may be said to have begun with the translation into German of Tindal's *Christianity as old as the Creation* (1741), the application of a rationalistic method by Professor Wolff, of Halle University, to the philosophy of Leibnitz (1736-50), and the advent of Frederick the Great. The initial movements of rationalism were followed up by such scholars and theologians as Eberhard, Eichhorn, Paulus, Teller, and Steinbart. With the beginning of the nineteenth century, however, a new development occurred, when Schleiermacher

published in 1799 his *Discourses on Religion.* In his teaching he sought to establish a distinction between the dry rationalism of the understanding and the spiritual rationalism of what he called the religious consciousness. Instead of accepting the Old and New Testaments as the supreme standard of religious truth Schleiermacher recognized them as only the recorded consciousness of the early church; instead of finding in revelation a divine mode of conveying doctrine, he found it to be that illumination which the human mind receives from historical personages who have a genius for religion. In this form of reconstructive rationalism he was followed by De Wette, Fries and Jacobi, and this second period continued until 1835. In this year Strauss published his *Leben Jesu* ('Life of Jesus'), a work in which, from the Hegelian standpoint, and in a destructive spirit, he discusses the origin of the New Testament. The movement which this originated has taken a tendency which is chiefly associated with scientific materialism, agnosticism, etc., and rationalism as a distinctive phase of religious controversy may be said to have then ceased.

Ratisbon (rat'is-bon; German, *Regensburg*), a town of Bavaria, capital of the province of Oberpfalz or Upper Palatinate, stands on the right bank of the Danube, opposite the junction of the Regen, 65 miles N. N. E. of Munich and 53 miles S. E. of Nuremberg; 1010 feet above the sea. It is very irregularly built, and the streets are generally narrow and winding. The houses are more remarkable for their venerable appearance than for architectural merit, though some of them are imposing, having once been residences of the mediæval nobles, and having towers intended for defensive purposes. There are, however, several spacious and handsome streets and squares, and numerous fountains. The most remarkable public buildings are the cathedral, founded in 1275, restored in 1830-38, a noble example of German Gothic, with a lofty and imposing front, flanked by two towers with open-work spires, and having a richly-sculptured portal; the Rathhaus, where the German diet held its sittings from 1645 to 1806; the Romanesque church of St. Emmeran; the palace of the princes of Thurn and Taxis (formerly abbey of St. Emmeran); the ducal and episcopal palace, the royal villa, the mint, theater, synagogue, public library, antiquarian museum, picture-gallery, etc. The suburb Stadt am Hof, on the opposite bank of the Danube, is connected with Ratisbon by an old stone bridge. The manufactures embrace lead and colored pencils, porcelain and stoneware, hosiery, woolen cloth, leather, machinery, hardware, gloves, sugar, and tobacco. There are also breweries and other works. The river trade is important. About 6 miles to the east is the celebrated Walhalla (which see). Ratisbon existed under the Celtic name of *Radasbona* in pre-Roman times, and was a Roman frontier fortress under the name of *Castra Regina.* Subsequently it became the residence of the old dukes of Bavaria, rose to the rank of an imperial city, and continued long to be the chosen seat of the imperial diets. The sieges which it has stood number no less than seventeen. Pop. 45,426.

Ratitæ (ra-tī'te), Huxley's second division of the class of Aves or birds, the other two being the Saururæ and Carinatæ. See *Ornithology.*

Ratlam (rat'lam), a native Indian state, governed by a rajah and under the British Central Indian Agency; area, 729 sq. miles; pop. 87,314. It has a capital of the same name, which is the center of the Malwa opium trade. Pop. 36,321.

Ratlines (rat'linz), small lines which traverse the shrouds of a ship horizontally, at regular distances of about 15 to 16 inches, from the deck upwards, forming a variety of ladders reaching to the mast-heads.

Ratnagiri (rut-nä'jē-re), a maritime district of India in the Konkan division of the Bombay Presidency. Area, 3922 sq. miles; pop. 1,167,927.—RATNAGIRI, the capital, on the Malabar coast, 170 miles S. of Bombay. Pop. 16,094.

Rat-snake, a snake destitute of poison fangs (*Coryphodon Blumenbachii*), domesticated in Ceylon on account of its usefulness in killing rats. It can easily be tamed.

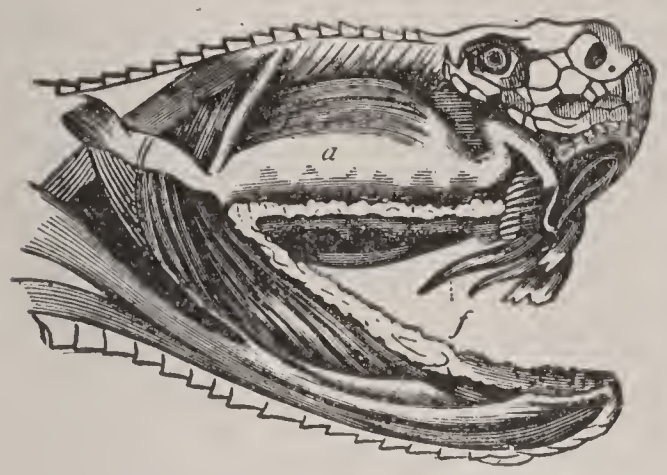
Rattan (ra-tan'), the commercial name for the long trailing stems of various species of palm of the genus *Galămus*, such as *C. Rotang*, *C. rudentum*, *C. verus*, etc., forming a considerable article of export from India and the Eastern Archipelago. They have all perennial, long, round, solid, jointed, unbranching stems, extremely tough and pliable. All the species are very useful, and are employed for wickerwork, seats of chairs, walking-sticks, thongs, ropes, cables, etc.

Rattany. See *Ratany.*

Rattazzi (rat-tat'sē), URBANO, an Italian statesman, born in

1808, died in 1873. He practiced as an advocate in his native Piedmont; in 1848 was returned as deputy to the Chamber at Turin; became leader of the democratic party, minister of the interior, and in 1849 practically head of the government. He became prominently unpopular in 1862 on account of his opposition to Garibaldi's advance on Rome.

Rattlesnake (rat'l-snāk), a name of various venomous American snakes of the genus *Crotălus*, family Crotalidæ, distinguished from the other members of the family by the tail terminating in a series of articulated horny pieces, which the animal vibrates in such a manner as to make a rattling sound. The function of the 'rattle' is dubious. The rattlesnake is one of the most deadly of poisonous serpents,



Head of Rattlesnake, dissected.
a, poison gland. *f*, poison fangs.

but hogs and peccaries kill and eat it, finding protection in the thickness of their hides and the depth of their layers of fat. A number of species belong to the United States and Mexico. East of the Mississippi the *C. horridus*, or banded rattlesnake, is the best known and most dreaded species. It is naturally a sluggish animal, ready to defend itself but seldom commencing the attack. It feeds on rats, squirrels, small rabbits, etc., and reaches a length of 5 or 6 feet. Other species are the *C. durissus*, or striped rattlesnake, found from Mexico to Brazil; *C. adamanteus*, the diamond rattlesnake; *C. lucifer*, the western black rattlesnake; *C. confluentus*, the prairie rattlesnake; *C. cerastes*, the horned rattlesnake of the American deserts. Other rattlesnakes belong to the allied genus *Candisona*, as *C. tergemina*, the black rattlesnake; *C. miliria*, the ground rattlesnake.

Rattlesnake-root, a name for *Polygăla Senĕga*, an American plant used to cure the bite of the rattlesnake.

Rattlesnake-weed, the American plant *Eryngium virginieum*, used as a cure for the bite of the rattlesnake.

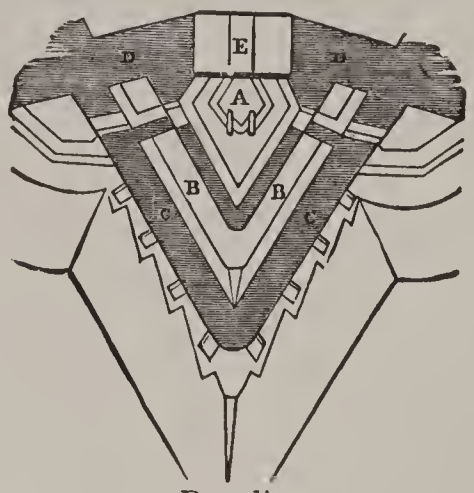
Rauch (rouh), CHRISTIAN, one of the most distinguished of German sculptors, born at Arolsen in 1777; died in 1857. He received some instructions from the sculptor Ruhl, at Cassel, afterwards proceeded to Berlin to act as one of the royal lackeys, modeled a bust of the queen, and in 1804 went to Rome, where he made the acquaintance of Thorwaldsen and Canova, and obtained the patronage of Wilhelm von Humboldt. He received an invitation in 1811 from the king of Prussia to design a monument of Queen Louisa, and produced a noble work which established the fame of the artist. From this time onwards he was the sculptor of an immense number of works in all the branches of the statuary art. He was especially great in ideal figures and in portraiture. Among his *chefs d' œuvre* may be mentioned the monument of *King Frederiek William III and Queen Louisa* in the Charlottenburg mausoleum, the colossal equestrian statue of *Frederiek the Great* at Berlin, having the base surrounded by groups of his most distinguished contemporaries, and forming altogether one of the most notable monuments in Europe; the six colossal figures of *Vietory* in the Walhalla, and a group representing *Moses with his hands supported by Aaron and Hur.*

Ravaillac (rà-và-yàk), FRANÇOIS, the murderer of Henry IV of France; born in 1578. He commenced life as valet to an attorney, and afterwards became attorney's clerk, and schoolmaster. He afterwards took service in the order of the Feuillants, but was expelled as a visionary. His various disappointments and his religious fanaticism led him to plan the assassination of Henry IV, which he successfully accomplished May 14, 1610. Upon this he was seized, horribly tortured, and put to death.

Ravelin (rav'lin), a detached triangular work in fortification, with two embankments which form a projecting angle. In the figure B B is the ravelin with A its redout, and C C its ditch, D D being the main ditch of the fortress, and E the passage giving access from the fortress to the ravelin.

Raven (rā'vn), a large bird of the crow family and genus *Corvus* (*C. corax*). Its plumage is entirely black; it is above 2 feet in length from the tip of the bill to the extremity of the tail, and about 52 inches from tip to tip

of the extended wings. It can be taught to imitate human speech, and in a domes-



Ravelin.

tic state is remarkable for its destructiveness, thievishness, and love of glittering things. It flies high, and scents carrion, which is its favorite food, at the distance of several miles; it feeds also on fruit, small animals, etc. It is found in every part of the globe.

Ravenala (rav-e-na'la), a fine large palm-like tree of Madagascar, order Musaceæ (plantains), with leaves 6 to 8 feet long. It is called *travelers' tree*, because of the refreshing water found in the cup-like sheaths of the leaf-stalks. Its leaves are used for thatch and the leaf-stalks for partitions. The seeds are edible and the blue pulpy fiber surrounding them yields an essential oil.

Ravenna (rȧ-ven'nȧ), a town of Italy, capital of the province of the same name, on the Montone,

St. Apollinare ad Classem, Ravenna.

about 4 miles west of the Adriatic, and 43 miles east by south of Bologna. It stands in a marshy district, has a circuit of about three miles, and its streets are in general regular and spacious. The principal edifices are the cathedral, founded in the fourth but rebuilt during the seventeenth century, consisting of nave and aisles with a dome, and adorned with some of Guido's finest paintings; the ancient baptistery, an octagonal structure; the church of San Vitale, an octagonal building with a large dome in the pure Byzantine style, one of the earliest of Christian churches, having been consecrated in 547; the Basilica of San Giovanni Evangelista, founded in 414, but much altered by restoration; the church of San Apollinare Nuovo (or San Martino), an excellent specimen of the ancient basilica; the mausoleum of the empress Galla Placidia, daughter of Theodosius the Great, dating from the fifth century; the palace of Theodoric, king of the Ostro-Goths; the tomb of Dante; the town-house, library, museum, etc. The manufactures are of little importance. Its harbor was in early times large enough to contain the fleets of Augustus, but it gradually silted up. It is now connected with the Adriatic by the Canale Naviglio at Porto-Corsini. Ravenna is an ancient place, and during the decline of Rome, A.D. 404, Honorius made it the seat of the Western Empire. In his reign and the regency of his sister Placidia it was adorned with many of its noblest edifices. Thereafter it fell into the hands of Odoacer, who in his turn was expelled by Theodoric, under whom it became the capital of the Goths. It was recaptured by Belisarius, who made the town and its territory an exarchate. This exarchate was terminated by Astolphus, king of the Lombards, who made Ravenna the metropolis of the Longobardic Kingdom in 752. Pepin and Charlemagne, having succeeded in expelling the Lombards, made a present of Ravenna and its exarchate to the pope, under whose control it remained till the year 1860. Pop. 35,543, or as commune 64,031. The province has an area of 715 square miles; pop. 235,485.

Ravenna, a village, capital of Portage Co., Ohio, 38 miles S. E. of Cleveland. It has iron works, carriage and hearse factories, and other industries. Pop. 5310.

Ravensburg (rä'vens-börg), an old town of Würtemberg, in a valley on the Schussen, 22 miles E. N. E. of Constance. It is irregularly built, and has manufactures of paper, silk, flax, cotton, etc. Pop. 14,614.

Ravenscroft (rā'vens-kroft), THOMAS, an English composer; born in 1592; died in 1640. He was trained in St. Paul's choir, and received the degree of bachelor of music

Painting by J. W. Waterhouse.

AT THE IMPERIAL COURT OF RAVENNA

"And the amusement of feeding poultry became the serious and daily care of the Emperor Honorius of the West."

from Cambridge. In 1611 he published a collection of twenty-three part-songs, under the title of *Melismata;* in 1614 appeared another collection of part-songs, prefixed by an essay; and in 1621 he published his *Whole Book of Psalms*, containing a tune for each of the 150 psalms, harmonized in four parts by all the great musicians of the period.

Rawalpindi (rä′wäl-pin′dē), a town of British India, in the Punjab, capital of the district of its own name, situated in the doab formed by the Indus and the Jhilam. The barracks, capable of accommodating 2500 soldiers, are separated from the native town by the small river Leh. It has a good bazaar and a thriving transit trade between Hindustan and Afghanistan. Pop. 87,688.

Rawicz (rä′vich), or RAWITSCH, a town of Prussia, in the government and 55 miles south of Posen. It has manufactures of machinery, furniture, etc., and a trade in corn, cattle, and wool. Pop. (1905) 11,403.

Rawlinson (rą′lin-sun), GEORGE, born in 1815, educated at Trinity College, Cambridge; took a first-class in classics; became public examiner in 1854; preached the Bampton Lectures in 1859; was elected Camden professor of ancient history in 1861, and made a canon of Canterbury in 1872. Besides various short works on antiquity he published a translation of *Herodotus* with a commentary (1858-60); *The Five Great Monarchies of the Ancient Eastern World* (4 vols. 1862-67), followed by the *Sixth* (1873) and the *Seventh Oriental Monarchy* (1876); *History of Ancient Egypt* (2 vols. 1881); *Egypt and Babylon* (1885); *Phœnicia* (1889), etc. He died Oct. 6, 1902.

Rawlinson, SIR HENRY CRESWICKE, brother of the above, born in 1810; educated at Ealing School; entered the Bombay army in 1827; went on a diplomatic mission to Persia in 1833; proceeded afterwards to Afghanistan as political agent; became consul at Bagdad in 1844; a member of the Indian Council in 1858; sat in the House of Commons in 1865-68; and was appointed president of the Royal Geographical Society 1871-76. He published *A Commentary on the Cuneiform Inscriptions of Babylon and Assyria* (1850); *Outline of the History of Assyria* (1852); *Notes on the Early History of Babylon* (1854); and the *Cuneiform Inscriptions of Western Asia*, edited in association with E. Norris and G. Smith (5 vols. 1861-70). He was made a baronet in 1891 and died March 5, 1895.

Rawmarsh (rą′märsh), a town of England in Yorkshire, in the south of the West Riding, 2 miles from Rotherham, with iron-works and collieries. Pop. (1911) 17,190.

Rawtenstall (rą′ten-stąl), a town of Lancashire, England, 8 miles north of Bury, with cotton and woolen manufactures and coal mines. Pop. (1911) 30,516.

Ray (rā), a family of elasmobranchiate fishes, including the skate and allied forms, recognized by the flattened body and by the extreme broad and fleshy pectoral fins, which seem to be mere continuations of the body. These fishes produce large eggs which are inclosed in cartilaginous capsules quadrilateral in form, with processes at the corners, and known familiarly as 'mermaids' purses,' etc. The most common members of this group are the thornback ray or skate (*Raia clavāta*), so named from the curved spines which arm the back and tail; and the common gray or blue skate (*R. batis*), which possesses an acutely-pointed muzzle, the body being somewhat lozenge-shaped, and the color ashy-gray above. The starry ray (*R. radiāta*) is so-called from having a number of spines on its upper surface rising from rayed or starlike bases; it reaches a length of 30 inches. The sting ray (*Trygon pastināca*) occurs in the Mediterranean sea, and has the tail armed with a long spine, serving as a means of defense. Members of the ray family are found in all seas, and more than one hundred species are known.

Starry Ray (*Raia radiāta*).

Ray, JOHN, an English naturalist, born in 1628; died in 1705. He was educated at Cambridge, where he was successively appointed Greek lecturer, mathematical lecturer, and humanity reader, but resigned his fellowship rather than sign the Act of Uniformity. Accompanied by his friend and former pupil, Francis Willughby, he traveled over the greater part of the British Islands and the Continent, collecting botanical and zoölogical specimens. Finally he settled at his birthplace, Black-Notley, Essex. In 1667 he was elected a member of the Royal Society. His chief scientific works are: *Methodus Plantarum Nova*

(London, 1703, 8vo); *Historia Plantarum Generalis* (three vols. folio, 1686–1704); *Synopsis Methodica Animalium Quadrupedum et Serpentini Generis Vulgarium* (1693. 8vo); *Historia Insectorum* (1710, 4to); *Synopsis Methodica Avium et Piscium* (1713, 8vo); the *Ornithologia of Willughby*, arranged and translated (1676, three vols.); also an edition of his friend's *Historia Piscium* (1686, two vols. folio). Besides his numerous scientific writings, Ray published several works on divinity and other subjects, the best known of which are: *The Wisdom of God Manifested in the Works of the Creation*, a work which has run through many editions; *Collection of English Proverbs; Collection of Travels and Voyages*, etc. In 1844 a society named after Ray, the *Ray Society*, was formed in London for the promotion of natural history by the printing of original works, new editions, rare tracts, translations, etc., relating to botany and zoölogy, and which has issued a large number of valuable works.

Rayleigh (rā'li), JOHN WILLIAM STRUTT, LORD, born Nov. 12, 1842, was educated at Trinity College, Cambridge, where he was senior wrangler and first Smith's prizeman in 1865. He was president of the British Association in 1884-85, was professor of experimental physics at Cambridge, and succeeded Professor Tyndall as professor of natural philosophy at the Royal Institution. With Prof. Ramsay he discovered a new gaseous element, argon, for which they received the $10,000 Hodgkins prize. They subsequently discovered the rare element krypton.

Raymond (rā'mond), HENRY JARVIS, journalist, was born at Lima, New York, in 1820. He became managing editor of the *New York Tribune* in 1841, and founded the *New York Times* in 1851. Elected to the Assembly in 1849, he was made speaker, was subsequently elected lieutenant governor of New York, and in 1864 was elected to Congress. He died June 18, 1869.

Raynouard (rā-nö-är), FRANÇOIS JUSTE MARIE, a French poet and philologist, born at Brignoles, Provence, in 1761; died in 1836. He studied for the bar; was elected as a deputy to the Legislative Assembly; took part in the revolution and the affairs of the first empire; and became a member of the Corps Legislatif. He wrote several tragedies, such as *Scipion*, *Don Carlos*, *Charles I*, and *Les Templiers*, but he is chiefly remembered as a philologist who revived the study of Provençal by his *Choix des Poesies Originales des Troubadours* (1816–21, six vols. 8vo); *Lexique Roman, ou Dictionnaire de la Langue des Troubadours*, and a *Comparative Grammar of the Latins and Romancists*.

Razor (rā'zur), the well-known keen-edged steel instrument for shaving off the beard or hair. The edge and back of the blade are more or less curved, and the sides are slightly hollowed in grinding. It is usually made with a tang, which is fastened to the handle by a rivet. The handles are made of a great variety of materials. The great center of the razor manufacture has long been Sheffield, though great numbers of razors are now made in Germany and the United States. The savages of Polynesia still use two pieces of flint of the same size, or pieces of shells or shark's teeth ground to a fine edge for shaving.

Razor-back, one of the largest species of the whale tribe, the *Balænoptera* or *Rorquălus borcālis*, the great northern rorqual. See *Rorqual*.

Razor-bill, an aquatic bird, the *Alcatorda* or common auk. See *Auk*.

Razor-fish, a species of fish with a compressed body, much prized for the table. It is the *Coryphæna novaeula*.

Razor-shell (*Solen*), a genus of lamellibranchiate mollusca, forming the type of the family Solenidæ. They are common on both sides of the Atlantic; the shells are subcylindrical in shape; the hinge-teeth number two on each valve; and the ligament for opening the shells is long and external in position. The mantle is open in front, to give exit to the powerful muscular 'foot,' used by these molluscs for burrowing swiftly into the sandy coasts which they inhabit. The familiar species are the *Solen siliqua*, *S. ensis*, *S. vagīna*, *S. marginatus*, and *S. pellucidus*.

Razzi (rät'sē), GIOVANNI ANTONIO (GIANANTONIO), surnamed *Sodoma*, an Italian painter, born in 1479 at Vercelli in Piedmont; died in 1549 or 1554. At an early age he was brought to Siena, and as most of his life was spent there he is considered one of the painters of the Sienese school. He painted chiefly in fresco, and was employed by Julius II to decorate in the Vatican, but his best work is in the churches of Siena.

Ré, or RHÉ (rā), ILE DE, an island of France, in the Bay of Biscay, about 2 miles off the coast of department Charente-Inférieure, 6 miles west of Rochelle; greatest length, 18 miles; breadth, nearly 4 miles; area, 18,250 acres. The coasts on the south and west are lofty and pre-

cipitous, but there are several good harbors. Capital Saint Martin de Ré. Pop. (1906) 13,073.

Reaction (rē-ak'shun), in physics, counteraction, the resistance made by a body to the action or impulse of another body, which endeavors to change its state, either of motion or rest. It is an axiom in mechanics that 'action and reaction are always equal and contrary,' or that the mutual actions of two bodies are always equal and exerted in opposite directions. In chemistry, the term is applied to the mutual or reciprocal action of chemical agents upon each other. In pathology, reaction is the action of an organ which reflects upon another the irritation previously transmitted to itself.

Read (rēd), THOMAS BUCHANAN, painter and poet, born in Chester Co., Pennsylvania, in 1822. His early life was unsettled and wandering. In Boston, in 1843, he made his first essay as a poet. His paintings are full of poetic fancies, but the technical treatment is somewhat careless. His poems are marked by a fervent spirit of patriotism and artistic power in the description of American scenery and rural life. They embrace *The House by the Sea, The New Pastoral, Sylvia, or the Lost Shepherd, The Wagoner of the Alleghenies*, etc. He wrote a prose romance, *The Pilgrims of the Great St. Bernard.* Among his best pictures are *Longfellow's Children* and *Sheridan's Ride*, the latter an illustration of one of his most popular poems. He died May 11, 1872.

Reade (rēd), CHARLES, novelist, was born in Oxfordshire in 1814. He was educated at Magdalen College, Oxford, where he took the B.A. degree, and he was called to the bar in 1843. He became first known by his novel of *Peg Woffington*, which he afterwards dramatized, in conjunction with Tom Taylor, under the title of *Masks and Faces.* This was followed by *Christie Johnstone*, and *Never Too Late to Mend*, one of his 'novels with a purpose,' in which he attacked the English prison system. The most scholarly and artistic of his writings, *The Cloister and the Hearth*, dealing with the lives of the parents of Erasmus, appeared in 1861. He wrote various other novels, most of them very popular, and died April 11, 1884.

Reader (rē'der), specifically, one whose office it is to read prayers, lessons, lectures, and the like to others; as, (*a*) in the Roman Catholic Church one of the five inferior orders of the priesthood; (*b*) in the English Church a deacon appointed to perform divine service in churches and chapels, of which no one has the cure. (*c*) A kind of lecturer or professor in universities, etc. (*d*) In printing offices, a person who reads and corrects proofs. See *Printing.*

Reading (red'ing), a parliamentary and municipal borough of England, capital of the county of Berks, on the Kennet, near its confluence with the Thames, 36 miles west of London. The town is well built and laid out, and there are an assize hall, the Royal Berkshire hospital, a town-hall of recent erection in the Renaissance style, a grammar-school, etc. The industrial establishments include a large and celebrated biscuit factory, iron foundries, breweries, corn-mills, etc., and there is a considerable agricultural trade. There are interesting remains of a magnificent abbey founded by Henry I, who was buried within its precincts in 1135. Pop. (1911) 75,214.

Reading, a city of Pennsylvania, capital of Berks Co., beautifully situated amid mountains on the Schuylkill River, 59 miles N. W. of Philadelphia. It is seated in a rich agricultural district and in the vicinity of large anthracite coal fields and deposits of iron ore, which give it abundant industrial opportunities. Its chief industry is the manufacture of iron and steel, which give employment to many thousands of workmen, and is represented by blast furnaces, rolling mills, sheet-iron, boiler-plate, tube and car-wheel works, stove foundries, etc. There are also large manufactures of fur and woolen hats, leather, paper, lumber, cotton goods, hosiery, glass-ware, etc. Here are extensive railroad shops. Mount Penn and Mount Neversink, surrounding the city, are favorite places of resort in the summer. Pop. 96,071.

Reading, a village of Middlesex Co., Massachusetts, 12 miles N. by W. of Boston. Its manufactures include organ-pipes, rubber-goods, wire-brushes, etc. Pop. 5818.

Reagent (rē-ā'jent), in chemical analysis, a substance employed as a test to determine the presence of some other substance. Thus, the infusion of galls is a reagent which detects iron by a dark purple precipitate; the prussiate of potash is a reagent which exhibits a blue with the same metal, etc.

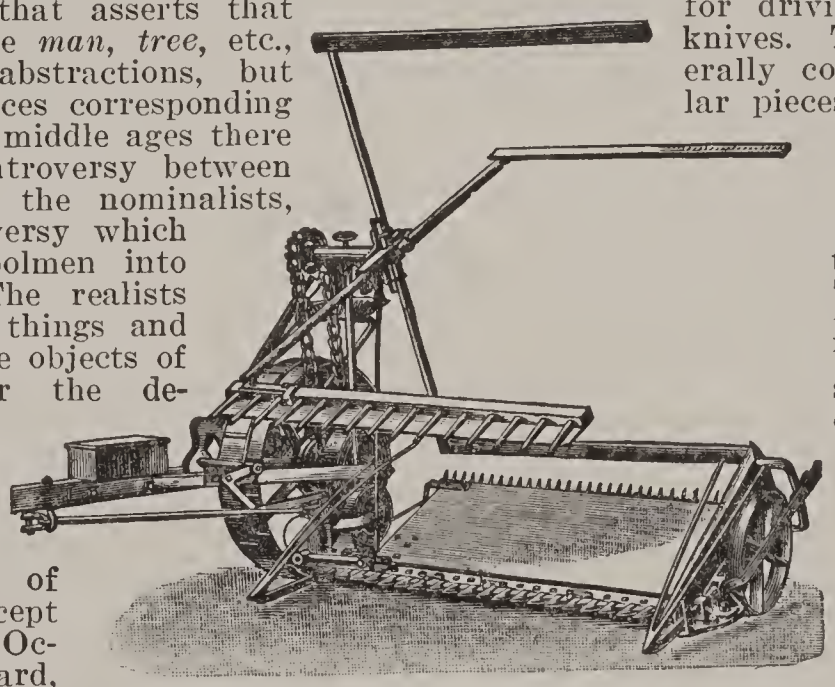
Real (rē'al), in law, pertaining to things fixed, permanent, or immovable. Thus *real estate* is landed property, including all estates and interest in lands which are held for life or for some greater estate, and whether such lands be of freehold or copyhold tenure. So a *real action* is an action brought for

the specific recovery of lands, tenements, and hereditaments.

Real′, a Spanish silver coin worth nearly 5 cents. In the course of exchange 100 reals are rated at $5.00. The real is also a Portuguese money of account, equal to 40 reis, or about 4 cents.

Realgar (rē′al-gȧr), a mineral consisting of a combination of sulphur and arsenic in equal equivalents; red sulphuret of arsenic, which is found native.

Realism (rē′al-izm), in metaphysics, as opposed to *idealism*, the doctrine that there is an immediate or intuitive cognition of external objects, while according to idealism all we are conscious of is our ideas. According to realism external objects exist independently of our sensations or conceptions; according to idealism they have no such independent existence. As opposed to *nominalism*, it is the doctrine that asserts that general terms like *man*, *tree*, etc., are not mere abstractions, but have real existences corresponding to them. In the middle ages there was a great controversy between the realists and the nominalists, the chief controversy which divided the schoolmen into rival parties. The realists maintained that things and not words are the objects of dialectics. Under the denomination of realists were comprehended the Scotists and Thomists, and all other sects of schoolmen, except the followers of Occam and Abelard, who were nominalists.



Single-wheel Back-delivery Reaping-machine.

Real Presence, the doctrine of the actual presence of the body and blood of Christ in the eucharist. See *Consubstantiation*, *Elevation of the Host.*

Real Schools (German, *Realschulen*) are those educational institutions of Germany between the elementary school and the university having for their special object the teaching of science, art, the modern languages, etc., in contradistinction to the ordinary grammar-schools and gymnasiums, in which the classical languages hold a more important place.

Ream (rēm), a quantity of paper, consisting of 20 quires of 24 sheets each. The printer's ream consists of 21½ quires or 516 sheets.

Reaping-hook (rēp′ing), or Sickle, a curved metal blade with a cutting edge on the inner side of the crescent, and set in a wooden handle, used for cutting down corn, grass, etc. It is about 18 inches in length, and tapers from a breadth of about 2 inches at the handle down to a more or less sharp point.

Reaping-machine, or Reaper, a machine for cutting down standing grain, etc., usually worked by a pair of horses, the cutting machinery being driven by being connected with the wheels on which the machine is drawn over the field. The cutting is effected rather in the manner of a pair of scissors than in that of a scythe, and a series of small toothed wheels have to be connected with the main wheel or wheels so as to produce the fast motion necessary for driving the cutting knives. These knives generally consist of triangular pieces of steel riveted to an iron bar, and are sometimes smooth-edged and sometimes tooth-edged. The knife-bar projects horizontally from the side of the machine at a short distance above the ground, and moves backwards and forwards on guides fixed at the back of a number of pointed fingers, which enter the standing grain and guide the straw to the edges of the knives. The motion of the bar being very rapid, the grain is cut down with corresponding speed, and as it is cut it is received on a platform fixed behind the knife-bar. In most cases a revolving rake with four inclined arms is attached to such machines, and set in motion by the driving-wheel. Two of the arms bring the grain well on to the knife-bar, and the others deliver grain cut at the back of the machine. Many of the recent machines are also fitted with a binding apparatus. An endless apron receives the grain as it is cut, and deposits it in a trough on the outer side of the machine. By an ingenious mechanical ar-

rangement the loose straw is caught and compressed by two iron arms; wire from a reel is passed round the sheaf, fastened by twisting, cut away, and the bound sheaf is tossed out of the trough by one of the arms by which it was compressed. Other apparatuses are constructed so as to bind with cord, straw rope, etc. See *Agriculture.*

Reason (rē'zn), a faculty of the mind by which it distinguishes truth from falsehood, and which enables the possessor to deduce inferences from facts or from propositions, and to combine means for the attainment of particular ends. Reason is the highest faculty of the human mind, by which man is distinguished from brutes, and which enables him to contemplate things spiritual as well as material, to weigh all that can be said or thought for and against them, and hence to draw conclusions and to act accordingly. In the language of English philosophy the terms reason and understanding are sometimes nearly identical, and are so used by Stewart; but in the critical philosophy of Kant a broad distinction is drawn between them.

Réaumur (rā-ō-mür), RENÉ ANTOINE FERCHAULT DE, a French physicist and naturalist, born in 1683 at La Rochelle; died in 1757. He studied under the Jesuits at Poitiers and afterwards at Bourges; went to Paris in 1703; in 1708 he was chosen a member of the Academy of Sciences; and for nearly fifty years he continued to be one of its most active members. As a natural philosopher he is celebrated for the invention of an improved thermometer, which he made known in 1731 (see *Thermometer*); but his greatest work is the *Mémoires pour servir á l'Histoire Naturelle des Insectes,* 6 vols.

Rebec (rē'bek), an old stringed instrument somewhat similar to the violin, having properly three strings tuned in fifths, and played with a bow. It was of Arabian or Turkish origin and was introduced by the Moors into Spain.

Rebec of the sixteenth century.

Rebecca (re-bek'a), a title given to the leader of an anti-turnpike conspiracy which was commenced in Wales, in 1839, by breaking down the turnpike-gates. The leader and his followers, who were generally dressed in women's clothes, were called 'Rebecca and her daughters,' and made their attacks by night on horseback. The name was derived from a strange application of a passage in Genesis xxiv, 60.

Rebellion (re-bel'yun), the taking up of arms, whether by natural subjects or others, residing in the country, against a settled government. By international law rebellion is considered a crime, and all persons voluntarily abetting it are criminals whether subjects or foreigners. When a rebellion has attained such dimensions and organization as to make of the rebel party a state *de facto,* and its acts reach the dimensions of war *de facto,* it is now the custom of the State to yield to the rebels such belligerent privileges as policy and humanity require, and to treat captives as prisoners of war, etc.,

Rebus (rē'bus), a group of words or a phrase written by figures or pictures of objects whose names resemble in sound the words or the syllables of which they are composed; thus, 'I can see you' might be expressed by figures or pictures of an eye, a can, the sea, and a ewe. In heraldry a rebus is a device on

Rebus of Abbot Islip, Westminster Abbey.

Rebus of Bishop Oldham, Exeter Cathedral.

a coat of arms conveying an allusion to the name of the person, as castles for Castleton, three cups for Butler. The accompanying cuts show rebuses on personal names (not very happy attempts, however), the one standing for the name *Oldham* (*Owledom*), the other for *Islip.*

Recall (rē-kạl'), in politics, signifies the power of the people to dismiss from office an unsatisfactory public servant. It was recently put in effect in Los Angeles, California, against Mayor Harper, on several grounds of unfitness. The mayor resigned before the vote was taken and a more suitable person was elected in his place. Similar action was taken in 1911 against the mayor of Seattle, Washington. The recent advocates of the Initiative and Referendum usually add the Recall to their programme, and it was adopted in 1911 as an amendment to the constitution of California.

Récamier (rā-ká-mi-ā), JEANNE FRANÇOISE JULIE ADÉLAIDE, whose maiden name was Bernard,

was born at Lyons in 1777; died in 1849. At the age of sixteen she went to Paris, and was there married to Jacques Récamier, a rich banker, more than double her own age. From this time her aim was to surround herself with personal admirers, and to attract to her salon the chief personages in French literature and politics. Her husband becoming bankrupt, she went to reside with Madame de Staël in Switzerland, but in 1811 was banished from Paris by Napoleon on account of her intimacy with his enemies. At the downfall of Napoleon she returned to Paris and again opened her salon, which as before continued to be a resort of men of intellect till her death. She had very intimate relations with Benjamin Constant and Chateaubriand.

Recanati (rā-ka-nä'tē), a town of Italy, province of Macerata, situated between Ancona and Rome. It contains many fine palaces, a Gothic cathedral, and a monument to Leopardi, who was born here. Pop. 14,590.

Recaption (rē'kap-shun), in law, the retaking, without force or violence, of one's own goods, chattels, wife, or children from one who has taken them and wrongfully detains them.

Receipt (re-sēt'), a written acknowledgment or account of something received, as money, goods, etc. A receipt of money may be in part or in full payment of a debt, and it operates as an acquittance or discharge of the debt only as far as it goes. In Britain if a receipt for a sum of £2 or upwards does not bear the penny government stamp it is inadmissible as evidence of payment. The stamp may be either adhesive or impressed on the paper. In the United States during and after the civil war receipts required internal revenue stamps, but this tax was abolished in 1870.

Receiver (re-sēv'er), a person specially appointed by a court of justice to receive the rents and profits of lands, or the produce of other property, which is in dispute in a cause in that court. The name is also given to a person appointed in suits concerning the estates of infants, or against executors, or between partners in business, or insolvents, for the purpose of winding up the concern.

Receiver of Stolen Goods, one who takes stolen goods from a thief, knowing them to be stolen, and incurs the guilt of partaking in the crime. In the United States the penalty is fixed by statutes in the several States; in Britain, if the theft amounts to felony, it is punished by penal servitude from 3 to 14 years, or imprisonment for 2 years.

Recent Formation (rē'sent), in geology, the name given to the latter of the two subordinate groups into which the post-tertiary formation has been divided, the former or earlier being the post-pliocene. This 'recent' group includes all superficial accumulations, as sand, gravel, silt, marl, peat-moss, coral reefs, etc., from the close of the glacial or bowlder-drift period down to and comprising those accumulations that are still in process of being formed.

Receptacle (re-sep'ta-kl), in botany, the name usually given to that part of a flower upon which the carpels are situated. But the term *receptacle* is used by botanists in different senses. Thus, it is used to signify the axis of the theca among ferns; that part of the ovary from which the ovules arise, commonly called the *placenta;* and also that part of the axis of a plant which bears the flowers when it is depressed in its development.

Rechabite (rek'a-bīt), among the ancient Jews, one of a family or tribe of Kenites whom Jonadab, the son of Rechab, bound to abstain from wine, from building houses, from sowing seed, and from planting vines (see Jer. xxxv, 6, 7). In modern application the Rechabites are a benefit society composed of total abstainers from intoxicating drinks, called the Independent Order of Rechabites.

Recife (re-sē'fā). See *Pernambuco.*

Reciprocal (re-sip'ru-kal), a term in mathematics. The reciprocal of a quantity is the quotient resulting from the division of unity by the quantity; thus, the *reciprocal* of 4 is ¼, and conversely the *reciprocal* of ¼ is 4; the *reciprocal* of 2 is ½, and that of $a+x$ is $\frac{1}{a+x}$.

Reciprocity (res-i-pros'i-ti), a term in economics commonly applied in international relationships to the arrangement whereby two nations mutually agree to import to each other certain goods, either duty free or with duties which are equivalent. It has been frequently applied of late years in tariff relations between the United States and other countries, and in the Tariff bill of 1909 is a maximum and minimum clause as a means of obtaining trade concessions from foreign countries, on the reciprocal principle of granting similar concessions. A bill in favor of reciprocity in trade

ROOSEVELT DAM AT TIME OF DEDICATION

ROOSEVELT DAM, UPSTREAM SIDE

This dam is located in the Salt River, Arizona, and was built by the U. S. Reclamation Service for irrigating the lands of the Salt River Valley. It is 280 feet high, 1080 feet long and creates a lake 25 miles long, and from 1 to 2 miles wide. The dam was dedicated by Ex-President Roosevelt, March 18, 1911.

with Canada was passed by Congress in 1911, but the measure was rejected by Canada. See *Frec-trade.*

Recitative (res-i-ta-tēv′), a species of vocal composition which differs from an air in having no definite rhythmical arrangement, and no decided or strictly constructed melody, but approaches in tonal succession and rhythm to the declamatory accents of language. It is used in operas, oratorios, etc., to express some action or passion, or to relate a story or reveal a secret or design. There are two kinds of recitative, *unaccompanied* and *accompanicd.* The first is when a few occasional chords are struck by an instrument or instruments to give the singer the pitch, and intimate to him the harmony. The second, which is now the more common, is when all, or a considerable portion, of the instruments of the orchestra accompany the singer.

Reclamation (rek-la-mā′shun), the reclaiming to fertility of arid and semi-arid lands. A reclamation act was passed by the United States government in 1902, under which the government is building irrigation works and selling the water thus obtained to settlers at prices sufficient to repay the cost of construction, the funds set aside for this purpose being the receipts from the sale of public lands. As a result about $60,000,000 has been received and $48,000,000 spent up to 1910. The total cost of all irrigation projects now in view is estimated at about $120,000,000, and the amount of land to be reclaimed over 3,000,000 acres. The cost per acre is less than $40.

Reclus (rė-klü), Jean Jacques Elisée, a French geographical writer, born in 1830. He left France in 1851 and spent several years in travel, afterwards publishing a great number of works, the results of his voyages and geographical researches. Among his chief works are *La Tcrrc*, the English edition of which, *Thc Earth*, has been very popular; and an exhaustive *Géographic Universclle*, which, voluminous as it is, he lived to complete. Being an extreme democrat, he became involved in the Paris commune of 1871, and was sentenced to transportation for life, but was amnestied in 1879. He earned a certain notoriety from his extreme views on social questions. He died July 4, 1905. He had three brothers, two of them writers of some distinction and one a distinguished surgeon of Paris, and three sisters who engaged in literary work.

Recognizance (re-kog′ni-zans), in law, an obligation of record which a man enters into before some court of record, or magistrate duly authorized, with particular conditions; as to appear at the assizes or quarter-sessions, to keep the peace, etc.

Recollet (rek′o-lā), or Rec′ollect, Friars or Nuns, the name given to a reformed body of Franciscans. The society was founded in Spain, and thence spread throughout Europe, so that in France, before the Revolution, they had 168 houses. The order still exists at a few places.

Reconnaissance (rē-kon′ā-sâns), in military affairs, an examination of a territory or of an enemy's position, for the purpose of directing military operations. In future wars flying machines are likely to be used for this purpose. The term is also used in geodetics, etc., a reconnaissance being an examination of a region as to its general natural features, preparatory to a more particular survey, as for determining the location of a road, a railway, a canal, or the like.

Record (rek′ord), specifically, an official copy of any writing, or account of any facts and proceedings, whether public or private, entered in a book for preservation. In a popular sense the term *records* is applied to all public documents preserved in a recognized repository. The public records of England have been regularly preserved since 1100. In 1857 the master of the rolls began the publication of the valuable series of chronicles and memorials known as the Rolls Series. The records or archives of the United States are easily accessible, and proper recommendation will open them to any one who wants to use them for scientific purposes. In the legal sense of the term *records* are authentic testimonies in writing of judicial acts and proceedings, contained in rolls of parchment and preserved, the courts of which the proceedings are thus preserved being called *courts of record.* In Scots law the record consists of the written statements or pleadings of parties in a litigation, and the 'closing of the record' is a formal step, sanctioned by the judge, after each party has put forward all he wishes to say by way of statement and answer.

Recorder (re-kor′dėr), in England, the chief judicial officer of a borough or city, exercising within it, in criminal matters, the jurisdiction of a court of record, whence his title is derived. The appointment of recorders is

vested in the crown, and the selection is confined to barristers of five years' standing. The same name is given to similar legal functionaries elsewhere, as in some American cities.

Recorder, a musical instrument, formerly much used, resembling a flageolet in shape. The instrument was wider in the lower half than in the upper; its tones were soft and pleasing, and an octave higher than the flute.

Recruiting. See *Enlistment.*

Rectangle (rek'tang-gl), a right-angled parallelogram, or a quadrilateral figure having all its angles, right angles and its opposite sides equal. Every rectangle is said to be *contained* by any two of the sides about one of its right angles.

Rectify (rek'ti-fī), in chemistry, to refine by repeated distillation or sublimation, by which the fine parts of a substance (as some kind of spirits) are separated from the grosser. To rectify liquors, in the spirit trade, is to convert the alcohol produced by the distiller into gin, brandy, etc., by adding flavoring materials to it. Thus in order to convert the spirit into London gin, juniper berries and coriander seeds are added previous to the last rectification. Œnanthic ether and other things give the flavor of brandy.

Rector (rek'tur), in the English Church, a clergyman who has the charge and cure of a parish, and has the parsonage and tithes; or the parson of a parish where the tithes are not impropriate. The heads of Exeter and Lincoln colleges, Oxford, are also so-called, and the chief elective officer of the Scottish universities receives the same title. In Scotland it is also the title of the head-master of an academy or important public school.

Rectum (rek'tum), in anatomy, the third and last part of the large intestine opening at the anus: so named from an erroneous notion of the old anatomists that it was straight.

Recurring Series (re-kur'ing), in algebra, a series in which the coefficients of the successive powers of x are formed from a certain number of the preceding coefficients according to some invariable law. Thus $a + (a+1)\ x + (2a+2)\ x^2 + (3a+3)\ x^2 + (5a+5)\ x^2 + \ldots$ is a recurring series.

Recusant (rek'ū-zant), in English history, after the Reformation, a person who refused or neglected to attend divine service on Sundays and holidays in the Established Church, or to worship according to its forms. Heavy penalties were formerly inflicted on such persons, but they pressed far more lightly on the simple recusant or nonconformist than on the Roman Catholic recusant. In 23 Elizabeth the fine was made for every month £20; and later in the same reign it was enacted that if recusants did not submit within three months after conviction they might, upon the requisition of four justices of the peace, be compelled to abjure and renounce the realm; and if they did not depart, or if they returned without due license, they were to be treated as felons, and suffer death without benefit of clergy.

Red, one of the primary colors, the color of that part of the spectrum which is farthest from the violet. The red rays are the least refrangible of all the rays of light. (See *Color.*) Red pigments or coloring matters include vermilion, realgar, cochineal, lakes and madders, coal-tar colors, etc. The different forms of oxide of iron are *Indian red*, which is pure, finely ground hæmatite; *Venetian red* and *colcothar*, which are coarser forms of the same substance. *Minium* or lead oxide, and another form of the same substance containing a little carbonate, are known as *Paris red.*

Red Admiral Butterfly (*Vanessa Atalanta*), the popular name of a common butterfly. The anterior wings are marked by a broad red band, outside of which are six white markings, while a bluish streak follows the wing-margin. The posterior wings are bordered with red, dotted with black spots, and have two bluish markings.

Redan (re-dan'), in field fortification, the simplest kind of work employed, consisting of two parapets of earth raised so as to form a salient angle, with the apex towards the enemy and unprotected on the rear.

Redans.

Several redans connected by curtains form lines of intrenchment.

Redbank, a town of Monmouth Co., New Jersey, on the Shrewsbury River, 26 miles s. of New York. It has manufactures of iron, carbon paper, carriages, cigars, etc. Pop. 7398.

Red-bird, the popular name of several birds in the United States, as the *Tanagra æstīva* or summer red-bird, the *Tanagra rubra*, and the Baltimore oriole or hang-nest.

Red-book, a book containing the names of all the persons in the service of the English government. The *red-book of the exchequer* is an ancient English record in which are registered the names of all that held lands per baroniam in the time of Henry II.

Redbreast, or ROBIN REDBREAST (*Erythăcus rubecŏla*), a species of bird belonging to the Dentirostral section of the Insessores, and to the family Sylviadæ, or warblers. The red breast of the male is the distinguishing feature of these well-known birds, the female possessing the breast of a duller yellowish-brown color. The young are of a dull yellowish-green color, and want the characteristic breast-coloring of the adult. In Britain the redbreast is a permanent resident, but in more northern countries it appears to be migratory, flying southwards in winter. It is a permanent bird in all the temperate parts of Europe, and it also occurs in Asia Minor and in North Africa. The nest is made of moss and leaves, and is lined internally with feathers. The eggs number five or six, and are white, spotted with pale brown. The robin redbreast of America is a thrush, the *Merŭla migratoria*, congeneric with the British blackbird; and one of the bluebirds, the *Sialia sialis*, is usually called the blue robin. The species of the Australian genus *Petræca*, allied to the wheatears, and remarkable for their bright plumage, are called by the colonists 'robins.'

Red Cedar, a species of juniper (*Junipĕrus virginiāna*), found in the United States and the West Indies; the heartwood is of a bright red, smooth, and moderately soft, and is in much request for the wooden covering of black-lead pencils. The demand for this purpose is so great that the tree is becoming very scarce.

Red Chalk. See *Reddle.*

Red Cloud, a noted chief of the Sioux Indians, born about 1820, and the last of the famous chiefs of the Sioux nation. He first came into notice as the leader in the Fetterman massacre of 1866 in Wyoming, when 100 men commanded by Captain Fetterman were surrounded and all killed. Made leader of the Sioux warriors, he became a terror to the whites in the region where he ruled, making frequent raids and committing many depredations. After the battle of Wounded Knee, in 1890, he and his followers stampeded to the hills, and he showed fine strategic skill in the campaign that followed. He was subsequently deposed from his chieftainship by General Crook and kept at the Pine Ridge agency, where he died December 10, 1909, about 90 years of age.

Red Coral (*Corallium rubrum*), an important genus of sclerobasic corals belonging to the order Alcyonaria. Red coral is highly valued for the manufacture of jewelry, and is obtained from the coasts of Sicily, Italy, and other parts of the Mediterranean.

Red Cross Societies, benevolent associations established immediately after the Geneva Convention of 1863 for the purpose of assisting the wounded in time of war. A central international committee maintains the connection between the various societies. The distinctive badge of the societies is a red Maltese cross on a white ground. Since their institution they have done much to alleviate the horrors of war and have lent their aid in disasters of various kinds. (See *Geneva Convention.*)—The order of the ROYAL RED CROSS was instituted by Queen Victoria in 1883 as a reward for ladies who have devoted themselves to the work of nursing the sick and wounded in war. The decoration consists of a red Maltese cross bearing the words 'Faith, Hope, and Charity.'

Red Currant (*Ribes rubrum*), a deciduous shrub much cultivated for its fruit, indigenous in the northern portions of Europe and America. The juice of the fruit is used for making jelly, and a well-known fermented liquor called currant wine.

Red-deer. See *Stag.*

Redditch (red'dich), a town of England, county of Worcester, 12½ miles S. S. W. of Birmingham. It is irregularly but generally well built, and has manufactures of needles, hooks and eyes, and fishing-tackle. Pop. 15,463.

Reddle, RADDLE, RUDDLE, or RED CHALK, a species of argillaceous ironstone ore. It occurs in opaque masses, having a compact texture. It is used as a pigment of a florid color, but not of a deep red. Sheep are generally marked with it.

Redeemable Rights, in law, those conveyances in property or in security which contain a clause whereby the granter, or any other person therein named, may, on payment of a certain sum, redeem the lands or subjects conveyed.

Redemption (re-dem'shun), in theology, the purchase of God's favor by the sufferings and death of Christ; the ransom or deliverance of sinners from the bondage of sin and the penalties of God's violated law by the atonement of Christ.

Redemption, EQUITY OF. See *Equity.*

Redemptorists (re-demp'tor-istz). a religious congregation founded in Naples by Liguori in 1732. They devote themselves to the education of youth and the spread of Roman Catholicism. They style themselves members of the congregation of the Holy Redeemer. By the law of 1872 they were expelled from Germany, and in the year 1880 France treated them in the same manner. They are also called *Liguorists.*

Red-fish, a species of fish (*Sebastes marīnus*) found on the Atlantic coast of North America, a large red fish caught in considerable numbers for food. A smaller species (*S. vivipărus*) receives the same name, and is called also *Red-perch, Rose-fish,* etc. The bergylt (which see) is closely akin.

Redgrave (red'grāv), RICHARD, born in London in 1804; became a student of the Royal Academy in 1826; his first notable picture was *Gulliver at the Farmer's Table;* in 1840, when he exhibited *The Reduced Gentleman's Daughter,* he was elected an Associate, and in 1851 became a Royal Academician. He produced other valuable paintings and from being headmaster of the Government School of Design he became inspector-general of art schools, and arranged the Museum of Art at South Kensington. He was joint author with his brother of *A Century of Painters* (1866.) Among his later pictures were *Sermons in Stones* (1871); *The Oak of the Mill Head* (1876); *Friday Street, Wotton* (1878); and *Hidden Among the Hills* (1881). He died Dec. 14, 1888.—His brother SAMUEL, born 1802; died 1876, is chiefly known for his *Dictionary of Artists of the British School.*

Red Gum, the popular name of a florid eruption usually occurring in infants before and during first dentition, and appearing on the most exposed parts, as the face, neck, arms, and hands. It is almost always an innocent disease, and seldom lasts over a month.

Red Gum-tree, one of the Australian Eucalypti (*Eucalyptus resinifĕra*), yielding a gum-resin valued for medicinal uses.

Red Hand, in heraldry, originally the arms of the province of Ulster, but granted to baronets as their distinguishing badge on the institution of the order in 1611. It consists of a sinister (or left) hand, open, erect, showing the palm.

Red Indians. See *Indians.*

Redlands, a city in San Bernardino Co., California, 8 miles S. E. of San Bernardino. It is in the center of the orange country and has canning and packing industries, etc. Also a health resort. Pop. 10,449.

Red-lead (Pb_3O_4), an oxide of lead produced by heating the protoxide in contact with air. It is much used as a pigment, and is commonly known as *Minium.*

Red-Men, IMPROVED ORDER OF, a social and benevolent organization founded in the United States in 1763, and again in 1834. It is based on the customs of the American aborigines and is the oldest society of its kind founded in the United States. The order is composed of subordinate bodies called tribes, officered by sachems, sagamores, prophets, etc. There are over 5200 of these tribes, with a membership of nearly 500,000.

Redmond, JOHN EDWARD, Irish reformer, born in Ireland in 1851, became a barrister at Gray's Inn 1886, and in Ireland in 1887. He was a member of Parliament from New Ross, 1881-85; North Wexford, 1885-91; Waterford, since 1891. He has taken an active part in legislation for Ireland, and is a leader in the present demand for Home Rule.

Red Ochre, a name common to a variety of pigments, rather than designating an individual color, and comprehending Indian red, light red, Venetian red, scarlet ochre, Indian ochre, reddle, bole, and other oxides of iron. As a mineral it designates a soft earthy variety of hæmatite.

Redon (rė-dōn), a town of France, department of Ille-et-Vilaine, on the Vilaine, where joined by the Oust. It has mining and shipping interests. Pop. (1906) 5170.

Redondillas (red-on-dil'yas), the name given to a species of versification formerly used in the south of Europe, consisting of a union of verses of four, six, and eight syllables, of which generally the first rhymed with the fourth and the second with the third. At a later period verses of six and eight syllables in general, in Spanish and Portuguese poetry, were called *redondil-*

las, whether they made perfect rhymes or assonances only.

Red Orpiment. Same as *Realgar*.

Redout (re-dout'), in fortification. a general name for nearly every class of works wholly inclosed and undefended by reëntering or flanking angles. The word is, however, most generally used for a small inclosed work of various form — polygonal, square, triangular, or even circular, and used mainly as a temporary field work.

Red Pine, a species of pine (*Pinus rubra*), also called *Norway Pine*. Its wood is very resinous and durable, and is much used in house and ship-building. It produces turpentine, tar, pitch, resin, and lampblack.

Red-pole, RED-POLL, a name given to several species of linnets. The greater redpole is the *Linōta cannabĭna;* the mealy red-pole is the *L. borcālis* or *canescens;* and the little redpole is the *L. linaria*. The same name is given to the *Sylvicŏla pctechia* of America, also called the *red-hcadcd warbler* and *ycllow red-pole*.

Red River, a large river of the United States, the southernmost of the great tributaries of the Mississippi. It rises in northern Texas, and has several sources, the chief, besides the main stream, being called the North and South Forks, which unite with it on the boundary of the Texas and of eastern Oklahoma. The stream then flows E. S. E., forming the boundary between Texas, Oklahoma and Arkansas; cuts off a corner of the latter state, and then flowing through Louisiana, falls into the Mississippi, 125 miles northwest of New Orleans; total course estimated at 1550 miles; chief affluents — the Washita, which joins it in Louisiana. and the False Washita, which it receives in Oklahoma. Much of its course is through rich prairies. About 1200 miles of the river are useful for navigation, but its mouth at low water can be entered only by boats drawing 2 feet.

Red River, or SONG-KA, a large river of Tonquin, formed by the junction of the Leteën and Songshai, the former rising in China, the latter in Laos. It flows S. E., passes Hanoi, and falls by several mouths into the Gulf of Tonquin.

Red River of the North, a river of North America, which rises in Elbow Lake, in Minnesota, flows south and southwest, and then nearly north, crossing from the United States into Manitoba, where it falls into Lake Winnipeg. Its entire length is 665 miles, 525 of which are in the United States. In Manitoba it receives the Assiniboine, another large stream, at its junction with which stands the town of Winnipeg.

Red River Settlement, a settlement formed in 1812 in Canada by the Earl of Selkirk on the banks of the above river; repurchased by the Hudson's Bay Company in 1836; finally transferred to the Canadian government in 1870, and now made part of the province of Manitoba.

Red Root, a name given to several plants, one of them *Ceanōthus Americānus*, natural order Rhamnaceæ. It has simple alternate leaves and large red roots, and is found in North America, where the leaves are used sometimes to make an infusion of tea.

Redruth (red'ruth), a market town of England, county of Cornwall, 9½ miles northwest of Falmouth. The inhabitants are principally employed in the tin and copper mines of the neighborhood. Pop. (1911) 10,815.

Red Sea, or ARABIAN GULF, a branch of the Indian Ocean, communicating with it by the Strait of Bab-el-Mandeb, stretching in a N. N. W. direction between Arabia on the east, Abyssinia, Nubia, and Egypt on the west, and connected with the Mediterranean on the north by the Suez Canal. It forms a long and narrow expanse, stretching for 1450 miles, with a breadth which averages about 180 miles, but diminishes gradually at its extremities. At the northern end it divides into two branches, one of which, forming the Gulf of Akaba, penetrates into Arabia for about 100 miles, with an average breadth of about 15 miles; while the other, forming the Gulf of Suez, penetrates between Arabia and Egypt for about 200 miles, with an average breadth of about 20 miles. The shores consist generally of a low, sandy tract, varying in width from 10 to 30 miles, and suddenly terminated by the abutments of a lofty table-land of 3000 feet to 6000 feet high. Occupying a long deep valley this water expanse has gradually been divided into three channels formed by coral reefs and islands. In the main channel the depth reaches in one place 1054 fathoms, but diminishes towards the extremities to 40 fathoms, while in the harbor of Suez it amounts to only 3 fathoms. From October to May, when the wind sets steadily from the south, a strong current flows in from the Strait of Bab-el-Mandeb; while from May to October, the

north wind continues to blow, which gives the current a southern direction. The result of this is to raise the sea-level by several feet north and south alternately. The atmosphere is excessively hot in the warm season. The principal harbors of the Red Sea are, on the African coast, Suez, Kosseir, Suakin, and Massowa; and on the Arabian coast, Jedda (the port of Mecca), Hodeida, and Mocha. The cross trade consists chiefly of slaves from Africa and pilgrims to Mecca, but the through traffic has been immensely increased by the Suez Canal. The Israelites are supposed to have crossed the Red Sea at its northern extremity in the Gulf of Suez, and near the town of that name, but opinions vary as to the precise spot.

Redshank, a bird of the genus *Totănus*, the *T. calidris*, so called from its red legs. It is about 11 inches long, and is known as a summer bird of passage in the northern parts of Europe and Asia, occurring in winter as far south as India. The spotted redshank (*T. fuscus*) visits Northern Europe in its spring and autumn migrations.

Red-snow. See *Protococcus*.

Redstart, a bird (*Ruticilla phœnicŭra*) belonging to the family Sylviadæ, nearly allied to the redbreast, but having a more slender form and a more slender bill. It is found in almost all parts of Britain as a summer bird of passage, and has a soft sweet song. The tail is red, whence the

Redstart (*Ruticilla phœnicūra*).

name, *start* being Anglo-Saxon *steort*, a tail. The forehead is white, the throat black, the upper parts lead-gray or brown. The black redstart (*Phœnicura tithys*) is distinguished from the common redstart by being sooty black on the breast and belly where the other is reddish brown. The American redstart is a small bird of the family Musicapidæ or fly-catchers, common in most parts of North America.

Red-top, a well-known species of bent-grass, the *Agrostis vulgāris*, highly valued in United States for pasturage and hay for cattle. Called also *English Grass* and *Herd's-grass*.

Reductio ad absurdum, a species of argument much used in geometry, which proves not the thing asserted, but the absurdity of everything which contradicts it. In this way the proposition is not proved in a direct manner by principles before laid down, but it is shown that the contrary is absurd or impossible.

Reduction (re-duk'shun), in arithmetic, the bringing of numbers of one denomination into another, as farthings to shillings, or shillings to farthings; pounds, ounces, pennyweights, and grains to grains, or grains to pounds.

Red-water, a disease of cattle, and occasionally of sheep, in which the appetite and rumination become irregular, the bowels speedily become constipated, and the urine reddened with broken-down red globules of blood. It is caused by eating coarse, indigestible, innutritive food, by continued exposure to inclement weather, and other causes which lead to a deteriorated state of the blood. Called also *Bloody Urine*, *Hæmaturia*, and *Moor-ill*.

Redwing, a species of thrush (*Turdus iliăcus*), well known as a winter bird of passage. It spends the summer in the northern parts of Europe and Asia, its winter range extending to the Mediterranean. It is about equal to the song thrush in size, congregates in large flocks, and has an exquisite song.

Redwing, a city, the capital of Goodhue Co., Minnesota, on the Mississippi River at the upper end of Lake Pepin, 41 miles S. E. of St. Paul. It is an important market for wheat, and has manufactures of flour, stoneware, iron, sewer-pipe, boats, furniture, etc. Pop. 9048.

Red-wood, the name of various sorts of wood of a red color, as an Indian dyewood, the produce of *Pterocarpus santalīnus;* the wood of *Gordonia Hæmatoxylon*, the red-wood of Jamaica; that of *Pterocarpus dalbergioides*, or Andaman wood; that of *Ceanōthus colubrīnus*, the red-wood of the Bahamas; that of *Sequoia sempervirens*, a coniferous tree of California, the red-wood of the timber trade; that of *Soymida febrifuga*, of which the bark is used in India for fevers, and has been employed successfully in Europe for typhus. The Californian red-wood is the

best known. The tree reaches a very great size, and forms forests in the coast mountains of California. It is closely related to the giant trees of California. The red-wood trees range from 4 to 6 feet in diameter. The lumber from it is of a deep red color, takes a beautiful polish, and is much valued for decorative purposes.

Ree, Lough, a lake of Ireland, formed by the Shannon, between the counties of Longford, Westmeath, and Roscommon, 17 miles long and 1 mile to 6 miles broad, studded with islands.

Reebok (rā′bok; that is roebuck), a species of South African antelope, the *Antilŏpe capreŏlus*. The horns are smooth, long, straight, and slender. The reebok is 2½ feet high at the shoulder, of a slighter and more graceful form than the generality of other antelopes, and extremely swift.

Reed (rēd), a name usually applied indiscriminately to all tall, broad-leaved grasses which grow along the banks of streams, pools, and lakes, and even to other plants with similar leaves, growing in such situations, as the bamboo. Strictly speaking, however, it is the name given to plants of the genera *Arundo*, *Psamma*, and *Phragmītes*, and especially to *Phragmītes commūnis* (the common reed). This, the largest of all the grasses of northern climates, is used for roofing cottages, etc. It is exceeded in size by the *Arundo donax* of Southern Europe, which sometimes grows to the height of 12 feet. The sea-reed or mat-grass (*Ammophila* (or *Psamma*) *arenaria*) is often an important agent in binding together the masses of loose sand on sea-shores. The bur-reed (reed-grass) is of the genus *Sparganium* of the reed-mace order. See *Reed-mace*.

Reed, in music, a vibrating slip or tongue in the mouthpiece through which a hautboy, bassoon, or clarinet is blown, originally made of reed; or one of the thin plates of metal whose vibrations produce the notes of an accordion, concertina, or harmonium, or a similar contrivance in an organ-pipe.

Reed, Sir Edward James, naval architect, born in 1830. He was at one time connected with Sheerness dockyard, and having become an authority on naval architecture he was appointed chief constructor to the navy, for which he designed a number of iron-clads and other vessels. He wrote a work on Japan and several on naval subjects.

Reed, Thomas Brackett, statesman, was born in Portland, Maine, Oct. 19,1839. He graduated at Bowdoin in 1860 and studied law. He was a member of the Maine legislature 1868-70 and attorney-general of the state 1870-72. In 1876 he was elected to Congress, and was Speaker of the House for three terms. As such he proved an able parliamentarian, and became widely known for his energy and arbitrary decision in 1890 of counting a quorum of members present despite their declining to vote. This decision as to actual presence and constructive absence made him bitter enemies, but was sustained by the Supreme Court. He resigned in 1899 and engaged in legal business in New York, where he died Dec. 6, 1902.

Reed Bird. See *Rice Bunting*.

Reed-mace (rēd-māS), a plant of the genus *Typha*, natural order Typhaceæ. Two species are common, *T. latifolia*, or greater reed-mace, and *T. angustifolia*, the lesser. These plants are also known by the name of *cat-tail*, and grow in ditches and marshy places, and on the borders of ponds, lakes, and rivers. They are tall, stout, erect plants, sometimes 6 or 8 feet high, with creeping root-stocks, long flag-like leaves, and long dense cylindrical brown spikes of minute flowers. They are sometimes erroneously called bulrush.

Reef (rēf), a certain portion of a sail between the top or bottom and a row of eyelet-holes running across the sail, one or more reefs being folded or rolled up to contract the sail in proportion to the increase of the wind. There are sets of cords called *reef-points* attached to the sail for tying up the reefs,

Wherry with fore-sail reefed, the main-sail showing reef-bands and reef-points.

and the sail is also strengthened by *reef-bands* across it. There are several reefs parallel to each other in the superior sails, and there are always three or four reefs parallel to the foot or bottom of

the chief sails which are extended upon booms. Many ships are now fitted with sails which can, by a mechanical appliance, be reefed from the deck.

Reef, a chain, mass, or range of rocks in various parts of the ocean, lying at or near the surface of the water.

Reel (rēl), a machine on which yarn is wound to form it into hanks, skeins, etc. Also a skeleton barrel attached to the butt of a fishing-rod, around which the inner end of the line is wound, and from which it is paid out as the fish runs away when first hooked.

Reel, a lively dance originating in Scotland, in one part of which the couples usually swing or whirl round, and in the other pass and repass each other, forming the figure 8. The music for this dance, called by the same name, is generally written in common time of four crotchets in a bar, but sometimes in jig time of six quavers. A variation of this dance, known as the Virginia Reel, is popular in the United States.

Reem (rēm), the Hebrew name of an animal mentioned in Job xxxix, 9, and translated as unicorn. There is little doubt that a two-horned animal was intended by the name, and the common belief now is that the reem was the aurochs or urus.

Re-entry (rē-en'tri), in law, the resuming or retaking the possession of lands lately lost. A *proviso for re-entry* is a clause usually inserted in leases, that upon non-payment of rent, etc., the term shall cease.

Rees (rēs), ABRAHAM, editor, was born in Wales in 1743; died in 1825. He was educated at Hoxton Academy, where he remained as tutor for over twenty years; became pastor of a Presbyterian church in Southwark, and afterwards in the Old Jewry. He edited E. Chambers's Cyclopedia (1776-86); and used this as the basis of a larger and very valuable work called Rees's Cyclopedia (1802-19, 45 vols.).

Reeve (rēv), the name given to the female of the bird called the ruff. See *Ruff*.

Reeve, the title of the official, existing in early times in England, who was appointed by the king to carry into execution the judgments of the courts presided over by the ealdorman (earl) and other high dignitaries, to levy distresses, exact the imposts, contributions, tithes, and take charge of prisoners.

Reeves, JOHN SIMS, tenor singer, born at Shooters' Hill, Kent, in 1822; appeared as a baritone on the stage at Newcastle in 1839, and for many years afterwards was very popular. He devoted himself more especially to oratorio and ballad singing, and long held the reputation of being the first of modern tenors. He published an autobiography in 1889. He died October 25, 1900.

Reference (ref'er-ens), in law, the process of assigning a cause depending in court, or some particular point in a cause for a hearing and decision, to persons appointed by the court.

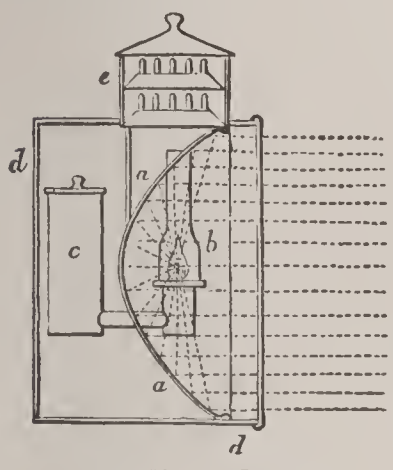
Referendum (ref·er·en'dum), a term used in the Swiss Confederation to denote the reference to the citizen voters of resolutions or laws passed by their representatives. If these, when so referred, are accepted by the majority of the voters of the canton, then they become part of the law of the land; but if they are rejected, then the rejection is final. The referendum is obligatory when the law or resolution affects the constitution; in other cases it is optional. The referendum has long been used in the United States for several purposes, such as the adoption of constitutions and of amendments to constitutions. As a constitutional provision giving the people the right to control and revise general legislation it was first adopted by South Dakota in 1898, and by Oregon in 1902. Since these dates other states have adopted it, the number up to January 1, 1911, being ten, though of these only five had effective measures, the others being in various ways incomplete or defective. The question of referendum amendments to state constitutions was a prominent issue in 1911. While defeated in most cases, it was adopted by California and in the new constitutions of Arizona and New Mexico. Up to the date named it had been fairly tried only in Oregon, its operation there being viewed as very satisfactory. This state alone has adopted an effective system of informing the electors concerning the measures to be submitted to popular vote, a pamphlet containing an official copy of the measure, together with arguments for and against it, being mailed to every voter prior to the election. See INITIATIVE AND REFERENDUM.

Refining of Metals, the processes by which the various metals are extracted from their ores, and obtained in a state of purity. See the articles on the several metals.

Reflection (re-flek'shun), specifically, in physics, the change of direction which a ray of light, radiant heat, sound, or other form of radiant

energy, experiences when it strikes upon a surface and is thrown back into the same medium from which it approached. When a perfectly elastic body strikes a hard and fixed plane obliquely it rebounds from it, making the angle of reflection equal to an angle of incidence. This is also the case with light, but the light undergoes the change known as polarization. See *Polarization, Optics.*

Reflector (re-flek'tur), a polished surface of metal, or any other suitable material, applied for the purpose of reflecting rays of light, heat, or sound in any required direction. Reflectors may be either plane or curvilinear; of the former the common mirror is a familiar example. Curvilinear reflectors admit of a great variety of forms, according to the purposes for which they are employed; they may be either convex or concave, spherical, elliptical, parabolic, or hyperbolic, etc. The parabolic form is perhaps the most generally serviceable, being used for many purposes of illumination, as well as for various highly important philosophical instruments. The annexed cut is a section of a ship lantern fitted with an argand lamp and parabolic reflector. *a a* is the reflector, *b* the lamp, situated in the focus of the polished concave paraboloid, *c* the oil cistern, *d* the outer frame of the lantern, and *e* the chimney for the escape of the products of combustion. See *Optics, Lighthouse.*



Parabolic Reflector.

Reflexive Verb, in grammar, a verb which has for its direct object a pronoun which stands for the agent or subject of the verb, as I *bethought myself;* the witness *forswore himself.* Pronouns of this class are called *reflexive pronouns,* and in English are generally compounds with *self;* as, to deny *one's self;* though such examples also occur as: 'He bethought *him* how he should act'; 'I do repent *me.*'

Reflex Nervous Action, in physiology, those actions of the nervous system whereby an impression is transmitted along sensory nerves to a nerve center, from which again it is reflected to a motor nerve, and so calls into play some muscle whereby movements are produced. These actions are performed involuntarily, and often unconsciously, as the contraction of the pupil of the eye when exposed to strong light. See *Nerve.*

Reform (rē-form'), Parliamentary. See *Britain, History.*

Reformation (ref-ur-mā'shun), the term generally applied to the religious revolution in the sixteenth century which divided the Western Church into the two sections known as Roman Catholic and the Protestant. Before this era the pope exercised absolute authority over the whole Christian Church with the exception of those countries in which the Greek or Eastern Church had been established. He also had an influence in temporal affairs wherever his spiritual authority was recognized. Various abuses in discipline sprung up in the Church, and attention had often been called to these both by laymen and clerics. An important movement in the direction of a reformation was begun by Wickliffe (1324-84) in England, a movement which, on the Continent, was developed by Huss (1369-1415) and Jerome of Prague (1360-1416) with their Bohemian followers. But the times were not ripe for combined opposition. New and powerful influences, however, were soon at work. The Renaissance increased the number of scholars; the new art of printing diffused knowledge; while the universities gave greater attention to the Greek and Hebrew languages, and grew in numbers. Much of the intellectual force and fearlessness brought forth by the Renaissance was turned against the corrupt practices referred to. In the writings of Erasmus (1467-1536), as well as in a host of satires, epigrams, etc., the ecclesiastics of the time were held up to a derision which thoughtful men recognized as just. The condition of the Western Church, indeed, was such that a reformation of some kind was now inevitable. The great movement usually known as the Reformation was started by Martin Luther, an Augustine monk of Erfurt, professor of theology in the University of Wittenberg; and what immediately occasioned it was the preaching of indulgences in Germany by a duly accredited agent, Johann Tetzel, a Dominican monk of Leipzig. Luther condemned Tetzel's methods, first in a sermon and afterwards in ninety-five theses or questions which he affixed to the door of the great church, October 31, 1517. This at once roused public interest and gained him a number of adherents, among them men of influence in church and

state. Luther urged his spiritual superiors and the pope to put a stop to the doings of Tetzel and to reform the corruptions of the church in general. In consequence a heated controversy arose, Luther was fiercely assailed, and in 1520 excommunication was pronounced against him by Pope Leo X. (See *Luther.*) Upon this the dissenter appealed to a general council; and when his works were burned at Mainz, Cologne, and Louvain, he publicly committed the bull of excommunication with the papal canons and decrees to the flames (December, 1520). From this time Luther formally separated from the existing Church, and many of the principal German nobles, Hutten, Sickingen, Schaumburg, etc., some very eminent scholars, and the University of Wittenberg, publicly declared in favor of the reformed doctrines and discipline. Luther's bold refusal to recant at the Diet of Worms (April 17th, 1521) gave him increased power, while the edict of Worms and the ban of the emperor made his cause a political matter. By his ten months' seclusion in the Wartburg, after the Diet of Worms, Luther was secured from the first consequences of the ban of the empire, and the emperor was so much engaged by French and Spanish affairs that he almost wholly lost sight of the religious ferment in Germany.

Leo's successor, Adrian VI, now considered it necessary to interfere, but in answer to his demand for the extirpation of the doctrines of Luther he received a list of a hundred complaints against the papal chair from the German states assembled at the Diet of Nürnberg (1522). While Luther was publishing his translation of the New Testament, which was soon followed by the translation of the Old; and while Melanchthon was engaged on his *Loci Communes* (the first exposition of the Lutheran doctrines) serious preparations for the reform of ecclesiastical abuses were made in Pomerania, Silesia, in the Saxon cities, in Suabia, etc., and the Reformation made rapid progress in Germany. Luther's *Liturgy* had no sooner appeared (1522), than it was adopted in Magdeburg and elsewhere. New translations of the Bible into Dutch and French appeared, and at Meux in France a Lutheran church was organized. In vain did the Sorbonne condemn the principles of Luther, and powers political and ecclesiastical endeavor to stop this movement. In 1525 John, the successor of Luther's first patron Frederick in the Saxon electorate, Philip, landgrave of Hesse, and Albert of Brandenburg, duke of Prussia, publicly declared themselves Lutherans. Aided in great measure by the state of political affairs, the movement continued to spread rapidly. In these circumstances the emperor convened the Diet of Augsburg (June, 1530), at which Melanchthon read a statement of the reformed doctrine, now known as the *Confession of Augsburg.* The Catholic prelates replied to this by requiring the reformers to return to the ancient church within a certain period. The princes who favored the new movement refused to comply with this demand, and in March of the following year they assembled at Schmalkald and formed the famous league, in terms of which they pledged themselves to uphold the Protestant cause. This decisive step soon attracted powerful support, largely because of its political importance, and among others who joined the Schmalkald League were Francis I of France and Henry VIII of England. After the death of Luther (1546) war broke out, but at the Peace of Augsburg (1555) the Reformation may be said to have finally triumphed, when each prince was permitted to adopt either the Reformed or the Roman Catholic faith, and Protestantism thus received legal recognition.

The doctrines of the German reformer found a willing adherent in Gustavus Vasa, who in 1523 became King of Sweden. Gustavus induced the estates of the realm, in the Diet of Westeräs (1527), to sanction the confiscation of the monasteries, and declared himself supreme in matters ecclesiastical. The last remains of Catholic usages were abolished at a second Diet of Westeräs in 1544. The first systematic measures in favor of the Reformation in Denmark were taken by Frederick I, instigated by his son Christian, who had studied in Germany and became an enthusiastic Lutheran. At a diet held in 1536, at which no member of the clergy was allowed to be present, the assembly decreed the abolition of the Roman Catholic worship in the Danish dominions. In Hungary, where numerous Germans had settled, bringing Lutheranism with them, the new faith for a short time made rapid progress, especially in the cities and among the nobles. In Poland the Reformation found numerous adherents also. In Italy and Spain, however, Protestantism was mostly confined to the higher and cultivated classes, the Reformed faith taking scarcely any hold on the people at large. In Naples, Venice, Florence, and other cities Protestant churches were opened; but Protestantism was extirpated in Italy by the vigorous

action of the Inquisition and the instrumentality of the *Index Expurgatorius.* In Spain a few Protestant churches were established, and many persons of mark adopted the views of the Reformers. But here also the Inquisition succeeded in arresting the spread of the religious revolution. In the Swiss states the progress of Protestantism was of much more importance. It found a leader in Ulrich Zwingli, a preacher at Zürich, who, by sermons, pamphlets, and public discussions, induced that city to abolish the old and inaugurate a new Reformed Church. In this course Zürich was followed by Bâle, Berne, and other cities. Ultimately this movement was merged in political dissensions between the Reformed and the Catholic cantons, and Zwingli himself fell in battle (1531). Between Luther and Zwingli there were differences of opinion, chiefly concerning the Lord's Supper, in which the former showed considerable acrimony towards his fellow-reformer. The *Institutes of Calvin* formulated the doctrines of a large body of the reformers, who also accepted his ordinances regarding church discipline. (See *Calvin.*) After many tedious contests Calvin's creed was virtually accepted in the Netherlands and elsewhere, and it was introduced into Scotland by Knox. In France the Reformation seemed at first to find powerful support. Margaret, Queen of Navarre, sister of King Francis I, and many of the higher ecclesiastics favored the reformed doctrine. The New Testament was translated into French, churches to the number of 2000 were established by 1558, and the Huguenots, as the Protestants were called, formed a large religious party in the state. Here also, however, the religious element was mixed with political and personal hatreds, and in the civil strifes before and after the Massacre of St. Bartholomew (1572) the religious movement declined. The abjuration of Protestantism by Henry IV (1593) was a blow to the Huguenots, and though they obtained toleration and certain privileges by the Edict of Nantes (which see) this was finally revoked in 1685.

The Reformation in England was only indirectly connected with the reform movement in Germany. Wickliffe and the Lollards, the revival of learning, the writings of More, Colet, and Erasmus, the martyrdom of Thomas Bilney, had all combined to render the doctrine and discipline of the church unpopular. This feeling was greatly increased when the writings of Luther and Tyndale's translation of the Bible found eager readers. Then the political element came in to favor the popular reform movement. Henry VIII, in his efforts to obtain a divorce from Catherine, found it advisable to repudiate the papal supremacy and declare himself by act of parliament (1534) the supreme head of the Church of England. To this the pope replied by threats of excommunication, which were not, however, immediately executed. Yet the breach with Rome was complete, so far, at least, as the king was concerned. Under the new laws of supremacy and treason several of the clergy suffered at Tyburn; Sir Thomas More and Fisher, bishop of Rochester. were beheaded at Tower Hill; and the lesser and greater monasteries were suppressed. At this time there were three important parties in the state. There was the party who still held the pope to be the supreme head of the church; the king's party, who rejected papal authority but retained the Catholic faith; and there was the reformed party, who rejected both the authority and doctrine of the Roman Catholic Church. The doctrines of the Church of Rome, however, were still the established religion, and in 1539 the *Statute of the Six Articles* compelled all men, under penalty of burning, to admit six points of the Roman doctrine, of which the chief was the doctrine of transubstantiation. Yet the king (1544) allowed some progress to be made in the direction of change by the publication of the *Litany* and some forms of prayer in English. This movement was continued and the Reformation effected in all essential points during the reign of Henry's successor, Edward VI. The penal laws against the Lollards were abolished; the *Statute of the Six Articles* ceased to be enforced; the Protestant ritual and teaching was adopted by the church; all images were removed from churches; a new communion service took the place of the mass; a *First Book of Common Prayer* was compiled by Cranmer and purged of distinctive Catholic doctrine; and in 1549 the First Act of Uniformity enjoined the use of this book in all the churches. Still further, in 1551, the newly established faith of the Reformers was summed up in the *Forty-two Articles of Religion*, which, in the reign of Elizabeth, became the *Thirty-nine Articles of the Church of England.* By these and other means the Reformation was established gradually throughout England.

In Scotland the movement was more directly connected with the Continent, and in particular with Geneva. The first indication of the struggle for reform

is found in the martyrdom (1528) of Patrick Hamilton; and this policy of suppression was continued (1539-46) with great severity by Cardinal Beaton, until he himself became the victim of popular vengeance. Perhaps the most important result of this persecution, and the martyrdom of George Wishart, which Beaton had brought about, was that it determined John Knox to embrace the new reformed faith. In 1546-47 this Scottish reformer established himself as preacher to the Protestant congregation which held the castle of St. Andrews. When the castle was captured by the French fleet Knox was made prisoner and treated as a galley-slave, but regained his liberty after about eighteen months' hardship, and settled in England. During the Marian persecutions he withdrew to the Continent and visited the churches of France and Switzerland, but returned to Scotland in 1559. Here he at once joined the Protestant party; preached in Dundee, Perth, and St. Andrews, amid public tumult and the destruction of images, altars, and churches; and finally, under the protection of the Lords of the Congregation, he established himself as a preacher of Protestantism in St. Giles', Edinburgh. From this center Knox traveled all over Scotland teaching the reformed faith; and such was the roused spirit of the people, that when the Scottish parliament assembled (1560) a popular petition was presented demanding the abolition of popery. This was promptly accomplished, and at the assembling of the new Church of Scotland shortly afterwards Knox presented his reformed system of government under the name of the First Book of Discipline, which was adopted by the Assembly. (See *Knox.*) The position thus secured by the reformer was maintained and the Reformation successfully established in Scotland. In Ireland for various causes the Reformation never made much progress, and Roman Catholicism remained the prevalent religion in that country, as it is to-day the established religious system in France, Spain and Italy.

Refor'matory Schools, schools instituted for the training of juvenile offenders who have been convicted of an offense punishable by imprisonment. The first reformatory managed under legislative control was the one established in New York in 1824, known as the New York House of Refuge. Its success was so marked that at present there are fifty-six institutions in the United States for the reformation of the juvenile offenders. The treatment is mostly educational, although in many institutions the inmates are employed in productive labor nearly one-half of the time. In some reformatories, in late years, attention has been given to industrial training, with marked success. Reformatories throughout the United States compare favorably with the best in other countries, and are rapidly progressing, much attention having been given of late years to this means of dealing with the criminally inclined young. See *Industrial Schools.*

Reformed Church, in general, comprehends those churches which were formed at the Reformation; but the term is specifically applied to those Protestant churches which did not embrace the doctrines and discipline of Luther. The title was first assumed by the French Protestants, but afterwards became the common denomination of all the Calvinistic churches on the European Continent. The Reformed Church of America is a body known up to 1867 as the Reformed Protestant Dutch Church, being founded by settlers from Holland and holding Calvinistic doctrines.— The Reformed Episcopal Church was organized in the United States in 1873. It is small in numbers, its membership being about 10,000.

Reformed Presbyterians, or Camerons, a body of Christians who profess to hold the principles of the Church of Scotland at the period of the second Reformation, between 1638 and 1650. They claim to be the legitimate successors of that section of the Covenanters which was headed by Cameron and Cargill, who considered that Charles II had forfeited all title to their allegiance, having broken the solemn vows which he made at his coronation. When William of Orange was called to the throne in 1688 they were among the first to welcome him; but while they avowed their readiness to yield all loyal obedience and submission they openly declared their dissatisfaction with the Revolution settlement. In 1690 Presbyterianism was established in Scotland, but because the state claimed a certain control over the church this settlement was also repudiated by the Reformed Presbyterians. The position which the sect was thus compelled to occupy was that of dissenters from the church and protesters against the state. For upwards of sixteen years after they had publicly avowed their principles they remained in an unorganized condition and without a regular ministry. The first who exer-

cised this office was the Rev. John McMillan, who in 1706 demitted his charge as parish minister of Balmaghie, and in 1743 he met with a coadjutor in the Rev. Thomas Nairne, whereupon these two constituted a Reformed Presbytery in 1743. In 1810 three presbyteries were formed, and in 1811 a synod was constituted. The number of presbyteries was afterwards increased to six, and the number of ministers rose to about forty. In 1876 a large portion of them united with the Free Church of Scotland. The Reformed Presbyterians have established themselves in the United States but constitute a small fraction of the total Presbyterian membership.

Refraction (re-frak'shun), the deflection or change of direction impressed upon rays of light obliquely incident upon and passing through a smooth surface bounding two media not homogeneous, as air and water,—or upon rays traversing a medium, the destiny of which is not uniform, as the atmosphere. (See *Optics.*) A familiar instance of refraction is the broken appearance which a stick presents when thrust partly into clear water, the portion in the water apparently taking a different direction from the other portion. Glass, water, and other solids and fluids each have a different power of refraction, and this power in each case may be expressed numerically by a number known as the *index of refraction. Atmospheric refraction* is the apparant angular elevation of the heavenly bodies above their true places, caused by the refraction of the rays of light in their passage through the earth's atmosphere, so that in consequence of this refraction the heavenly bodies appear higher than they really are. It is greatest when the body is on the horizon, and diminishes all the way to the zenith, where it is nothing. *Double refraction* is the separation of a ray of light into two separate parts, by passing through certain transparent mediums, as Iceland-spar, one part being called the ordinary ray, the other the extraordinary ray. All crystals except those whose three axes are equal exhibit double refraction.

Refractor, or REFRACTING TELESCOPE. See *Telescope.*

Refrigerant (rē-frij'er-ant), a cooling medicine, which directly diminishes the force of the circulation, and reduces bodily heat without any diminution of nervous energy. The agents usually regarded as refrigerants are weak vegetable acids, or very greatly diluted mineral acids; effervescing drinks, saline purgatives, etc. Refrigerants in medicine and surgery are also applied externally in the form of freezing-mixtures prepared with salt and pounded ice for the purpose of lowering the temperature of any particular part of the body.

Refrigeration. See *Refrigerator.*

Refrigerator (re-frij'er-ā-tur), a name applied to cooling apparatus of various kinds. One kind is an apparatus for cooling wort, beer, etc., consisting of a large shallow vat traversed by a continuous pipe through which a steam of cold water is passed. The wort, etc., runs in one direction and the water in another, so that the delivery end of the wort is exposed to the coolest part of the stream of water. Another kind of refrigerator is a chest or chamber holding a supply of ice to cool provisions and prevent them spoiling in warm weather; or a vessel surrounded by a freezing-mixture used in the manufacture of ice-cream, ices, etc. Refrigeration is now conducted on a large scale in cold-storage establishments, in which air cooled to a low temperature is employed as the agent.

Refuge (ref'ūj), CITIES OF. See *Cities of Refuge.*

Refugee (ref-ū-jē'), a person who seeks safety in a foreign country to escape persecution for religious or political opinions. A large historical movement of this kind occurred when the Edict of Nantes was repealed in France (1685). Such were the oppressions then put upon the Protestants by the dominant Roman Catholic party that 800,000 of the former, it is estimated, sought refuge in England, Denmark, Holland, Switzerland, and Germany, France suffering seriously by the forced emigration of its ablest industrial population.

Regal (rē'gal), a small portable organ played with the fingers of the right hand, the left being used in working the bellows. It was much used during the sixteenth and seventeenth centuries.

Regalia (re-gā'li-a), the emblems or insignia of royalty. The regalia of England consist of the crown, scepter with the cross, the verge or rod with the dove, the so-called staff of Edward the Confessor, several swords, the ampulla for the sacred oil, the spurs of chivalry, and several other articles. These are preserved in the jewel-room in the Tower of London. The regalia of Scotland consist of the crown, the scepter, and the sword of state. They, with

several other regal decorations, are exhibited within the crown-room in the

Regal, from an old painting.

castle of Edinburgh. The term is also improperly applied to the insignia, decorations, etc., of orders, secret societies, etc., and similar institutions.

Regatta (re-gat'a), originally a gondola race held annually with great pomp at Venice, and now applied to any important showy sailing or rowing race, in which a number of yachts or boats contend for prizes.

Regelation (rē-jel-ā'shun), refreezing, a name given to the phenomena presented by two pieces of melting ice when brought into contact at a temperature above the freezing point. In such a case congelation and cohesion take place. Not only does this occur in air, but also in water at such a temperature as 100° Fahr. The phenomenon, first observed by Faraday, is of importance in the theory of glacier movements. See *Glaciers*.

Regeneration (re-jen-er-ā'shun), in theology, is the equivalent used by the English translators of the Bible for the Greek word *palingenesia*, which occurs only twice in the New Testament, in Matt. xix, 28 and in Titus iii, 5. In the former passage the term is applied generally to the gospel dispensation as a process of renovation; in the latter it is used as descriptive of the process of individual salvation. An equivalent term is used in 1 Peter i, 3, where it is translated 'begotten us again;' and in one or two other passages regeneration, as a theological term, refers to the doctrine of a change effected upon men by divine grace, in order to fit them for being partakers of the divine favor, and for being admitted into the kingdom of heaven.

Regent (rē-jent), a person who governs a kingdom during the minority, absence, or disability of the king or queen. In most hereditary governments the maxim is, that this office belongs to the nearest relative of the sovereign capable of undertaking it; but this rule is subject to many limitations.— In the English universities the name is given to members with peculiar duties of instruction or government. In the United States there are regents of various educational, benevolent and public institutions.

Regent-bird, or KING HONEY-EATER (*Sericŭlus chrysocephălus*), a very beautiful bird of Australia, belonging to the family Meliphagidæ or honey-eaters. The color of the plumage is golden yellow and deep velvety black. It was discovered during

Regent-bird *Sericŭlus chrysocephălus*).

the regency of George IV, and was named in compliment to him.

Reggio di Calabria (red'jō), (ancient. *Rhegium Julii*), a seaport of South Italy, capital of a province of the same name, on the east coast of the Strait of Messina, a handsome and beautifully-situated town. The principal edifice is the cathedral, a spacious basilica. The seat of an archbishop, and with manufactures of silk, linen, pottery, perfume, etc., it was destroyed by a violent earthquake in December, 1908, together with many smaller places in the province, and the city of Messina, in Sicily. The greater part of its population of about 45,000 perished.

Reggio nell' Emilia (*Rhegium Lepidi*), a town of North Italy, capital of the province of the same name, 15 miles W. N. W. of Modena. It is surrounded by walls and ramparts, has regular streets, is the seat of a bishop, has an ancient cathedral with a lofty dome, and several other churches, a handsome town-house, museum, library, theater; manufactures of linen and silk goods, and a trade in cattle and wine. Pop. 58,490.— The

province of Reggio lies between those of Parma on the west and Modena on the east; area, 877 square miles.

Regillus (rē-jil'us), anciently a small lake of Italy, in Latium, to the southeast of Rome (site uncertain), celebrated for a great battle between the Romans and Latins in B.C. 496.

Regiment (rej'i-ment), a body of regular soldiers forming an administrative division of an army, and consisting of one or more battalions of infantry or of several squadrons of cavalry, commanded by a colonel and other officers. A regiment is the largest permanent association of soldiers, and the third subdivision of an army corps, several regiments going to a brigade, and several brigades to a division. These combinations are temporary, while in the regiments the same officers serve continually, and in command of the same body of men. The strength of a regiment may vary greatly, as each may comprise any number of battalions. In the United States army an artillery regiment consists of twelve batteries, and has 595 enlisted men; a cavalry regiment comprises twelve troops each numbering seventy-eight privates; an infantry regiment contains ten companies, the number of privates varying from fifty to one hundred men in each company. In Britain, under the new army organization, the country is divided into regimental districts.

Regina (rē-jī'na), capital of the Province of Saskatchewan, in the Canadian Northwest, a rising town on the Canadian Pacific Railway, situated near the fertile wheat district of the Qu'appelle Valley. Pop. (1911) 30,213.

Regiomontanus (rā-ji-o-mon-ta'-nus), a German astronomer, whose real name was Johann Müller, was born at Königsberg (in Latin *Regiomontum*), in Franconia, in 1436; died in 1475. He was educated at Leipzig; studied mathematics at Vienna; accompanied Cardinal Bessarion to Rome, where Beza gave him further instructions in Greek literature, which enabled him to complete a new abridgment in Latin of the *Almagest of Ptolemy* (Venice, 1496). In 1471 he built an observatory at Nürnburg, but he returned to Rome on the invitation of Sixtus IV, who employed him in the reformation of the calendar.

Register (re'jis-tẽr), a device for automatically indicating the number of revolutions made or amount of work done by machinery; or recording steam, air, or water pressure, or other data, by means of apparatus deriving motion from the object whose force, distance, velocity, direction, elevation, or numerical amount it is desired to ascertain. In music, the compass of a voice or instrument, or a portion of the compass of a voice; as the upper, middle, or lower register. Also, an organ stop, or the knob or handle by means of which the performer commands any given stop.—CASH REGISTER, an apparatus now widely in use in stores for registering the amount of cash received for sales.

Registration of Births, Deaths and Marriages. Parish registers of baptisms, marriages, and burials were instituted by Lord Cromwell while he was vicar-general to Henry VIII, and subsequently regulated by various acts of parliament. No thorough system, however, existed until in 1836 a Registration Act was passed applicable to England and Wales, which has been amended by subsequent acts. Somewhat similar systems exist in Scotland and Ireland. In the United States the record of deaths has always been tolerably accurate. The officiating minister, priest, or magistrate at a wedding, and the physician or midwife at a birth, are required, under penalty for failure to do so, to report to the proper office the name, age, sex, nativity, color, and social condition of the persons who marry, and the sex and color of children born, with nativity of the parents. As registration is not within the scope of federal legislation, much depends upon the co-operation of the States and cities.

Registration of Electors. In the United States there is no general law requiring the registration of voters; but 34 States have registration laws, without compliance with which no man can vote. Partial registration, as in cities, or cities and villages is required in several other States. In Britain registration of all persons qualified to vote is required, a list being published annually in each parish.

Regius Professors (rē'ji-us), is the name given to those professors in the English universities whose chairs were founded by Henry VIII. In the Scotch universities, the same name is given to those professors whose professorships were founded by the crown.

Regnault (rė-nō), HENRI VICTOR, a French chemist and physicist, born in 1810; died in 1878.

He was educated at the École Polytechnique, Paris; became professor at this institution in 1840, and professor of physics at the Collége de France the following year; chief engineer of mines in 1841; and director of the porcelain manufacture at Sèvres in 1854. He published *Cours Elémentaire de Chimie*, and *Premiers Eléments de Chimie*, both popular works.

Regulus (reg'ū-lus), a name originally applied by the alchemists to antimony. The term is now used in a generic sense for metals in different stages of purity, but which still retain to a greater or less extent the impurities they contained in the state of ore.

Reg'ulus, MARCUS ATTILIUS, a Roman general, who was made consul a second time in 256 B.C., and was engaged in a war with Carthage, in which he destroyed their fleet and landed his army in Africa. In the following year, however, he was defeated and taken prisoner by the Carthaginians. Sent to Rome on parole by his captors to negotiate peace, Regulus patriotically persuaded his countrymen to continue the war and returned to captivity, where he died under torture.

Reichenbach (rī'*h*en-bȧ*h*), a town of Prussia, province of Silesia, 30 miles southwest of Breslau, on the Peile. It has woolen and cotton manufactures. Pop. (1905) 15,984.

Reichenbach, a town of Saxony, in the circle and 7 miles southeast of Zwickau. It has manufactures of woolen and cotton goods; worsted and cotton mills; dye-works and bleachfields; machine works, foundries, etc., and a large trade. Pop. (1905) 24,915.

Reichenbach, CHARLES, BARON VON, a German scientist, born at Stuttgart in 1788; died in 1869. He studied law and natural science at Tübingen; established extensive works in Moravia, at which machinery, castings (statues, etc.), wood vinegar, tar, etc., were produced; published a monograph on geology; and gave his attention to animal magnetism, in connection with which he believed he had discovered a new force called *od*, regarding which he published various works. This supposed discovery is no longer credited. He is credited with some chemical discoveries, in particular of paraffin and creasote.

Reichenberg (rī'*h*en-ber*h*), a town of Bohemia, on the Neisse, 56 miles N. N. E. of Prague. It is the center of the woolen manufacture of Northern Bohemia, in connection with which industry there are a great number of establishments in the town and neighborhood. Pop. 34,099.

Reichenhall (rī'*h*en-hȧl), a town of Bavaria, 65 miles southeast of Munich, situated in the midst of romantic scenery, on the Saal. It has one of the most important salt-works in the kingdom, the salt being obtained from brine springs. The brine is also used for bathing purposes. Pop. 4927.

Reichstag (rī*h*s'tȧ*h*; German *reich*, a kingdom, and *tag*, a day, a diet), the imperial parliament of Germany, which assembles at Berlin. See *Bundesrath, Germany.*

Reid (rēd), MAYNE, juvenile writer, born in the north of Ireland in 1818; died in 1883. His love of adventure took him to America, where he traveled extensively as hunter or trader; joined the United States army in 1845 and fought in the Mexican war. He afterwards returned to London, where he became well known as a writer of thrilling juvenile stories, many of them based on his American experiences, such as the *Rifle Rangers, Scalp Hunters, The War Trail, The Headless Horseman*, etc.

Reid, THOMAS, a Scottish philosopher, born in 1710 at Strachan, Kincardineshire. He was educated at Marischal College, Aberdeen, and in 1737 was presented to the living of New Machar in Aberdeenshire. His first philosophical work was an *Essay on Quantity* (1748), in which he replied to Hutcheson, who had maintained that mathematical terms can be applied to measure moral qualities. In 1752 the professors of King's College, Aberdeen, elected Reid professor of moral philosophy in that college; and in 1764 he published his well-known work, *An Inquiry into the Human Mind on the Principles of Common Sense.* The same year he succeeded Adam Smith as professor of moral philosophy in Glasgow University, a position which he occupied until 1781. His other writings are, *Essays on the Intellectual Powers of Man* and *Essays on the Active Powers of the Human Mind.* His philosophy was directed against the principles and inferences of Berkeley and Hume, to which he opposed the doctrine of Common Sense (which see). He was the earliest expounder of what is known as the Scottish School of Philosophy, in which he was followed by Dugald Stewart and Sir William Hamilton.

His doctrines were adopted also by several eminent French philosophers. He died in October, 1796.

Reid, Whitelaw, editor, was born in Xenia, Ohio, Oct. 27, 1837. He graduated at Miami University in 1856. During the Civil war he was a correspondent on the Cincinnati *Gazette*, and in 1863-66 was librarian of the U. S. House of Representatives. After editorial work on several Ohio papers he was made in 1868 managing editor of the New York *Tribune* and became its editor-in-chief and principal proprietor in 1872. He was Minister to France in 1889, resigning April, 1892, after negotiating valuable reciprocity treaties. In 1892 he was defeated for the Vice-Presidency. He was a member of the Peace Commission at Paris after the war with Spain, and in 1905 was appointed Minister to England. He is the author of a number of works.

Reigate (rī′gāt), a municipal borough of England, county of Surrey, beautifully situated 19 miles s. s. w. of London, a place of considerable antiquity. Pop. (1911) 28,505.

Reign of Terror, a period of the French Revolution, conspicuous for its horrors and cruelties, under the leadership of Robespierre and Marat. It is generally considered to extend from January 21, 1793, the date of the execution of Louis XIV, to July 28, 1794, when Robespierre and other sanguinary leaders were guillotined on the spot where their victims had been killed.

Reindeer (rān′dēr), a species of deer found in the northern parts of Europe and Asia, the *Cervus tarandus* or *Tarandus rangifer*. It has

Reindeer (*Cervus tarandus*).

branched, recurved, round antlers, the summits of which are palmated; the antlers of the male are much larger than those of the female. These antlers, which are annually shed and renewed by both sexes, are remarkable for the size of the branch which comes off near the base, called the brow antler. The body is of a thick and square form, and the legs shorter in proportion than those of the red-deer. Their size varies much according to the climate, those in the higher Arctic regions being the largest; about 4 feet 6 inches may be given as the average height of a full-grown specimen. The reindeer is keen of sight, swift of foot, being capable of maintaining a speed of 9 or 10 miles an hour for a long time, and can easily draw a weight of 200 lbs., besides the sledge to which they are usually attached when used as beasts of draught. Among the Laplanders the reindeer is a substitute for the horse, the cow, and the sheep, as he furnishes food, clothing, and the means of conveyance. The reindeer has, of late years, been introduced into Alaska and Labrador, and promises to be of great utility to the natives.

Reindeer Moss, a lichen (*Cenomȳce rangiferīna*) which constitutes almost the sole winter food for reindeer, etc., in high northern latitudes, where it sometimes attains the height of 1 foot. Its taste is slightly pungent and acrid, and when boiled it forms a jelly possessing nutritive and tonic properties.

Reineke Fuchs (rī′nek-ė fu̱ks). See *Renard.*

Reinforced Concrete. See *Concrete.*

Reis (rā′is), a Turkish title for various persons of authority, as for instance the captain of a ship. Reis Effendi was formerly the title of the Turkish chancellor of the empire and minister of foreign affairs.

Reisner-work (rīs′nėr), a species of inlaid cabinet-work composed of woods of contrasted colors, named after Reisner, a German workman of the time of Louis XIV. See *Buhl-work.*

Relapsing Fever (rė-lapz′ing), a fever so-called from the fact that during the period of convalescence a relapse of all the symptoms occurs, and this may be repeated more than once. It is usually regarded as an epidemic and contagious disease. See *Fever.*

Release (rē-lēs′), in law, signifies, in general a person's giving up or discharging the right or action he has or claims to have against another or against his lands.

Relics (rel'iks), remains of saints and martyrs or objects connected with them, and especially memorials of the life and passion of our Lord, to which worship or a special veneration is sanctioned and practiced both in the Roman Catholic and Greek Churches. The doctrine of the Roman Catholic Church in regard to relics was fixed by the Council of Trent, which decreed in 1563 that veneration should be paid to relics as instruments through which God bestows benefits on men; a doctrine which has been rejected by all Protestant churches. The veneration of relics is not peculiar to Christianity, but has found a place in nearly every form of religion. Buddhism is remarkable for the extent to which relic-worship has been carried in it. The origin of relic worship or veneration in the Christian church is generally associated with the reverence paid by the early Christians to the tombs of the martyrs and to objects associated with their memory. Roman Catholics believe that relics are sometimes made by God instruments of healing and other miracles, and that they are capable of bestowing spiritual graces. The Council of Trent required bishops to decide on their authenticity. In course of time great abuses grew up in regard to relics; and it is scarcely necessary to add that the articles venerated as relics multiplied beyond measure. Not only did those of which the supply was necessarily limited, as the wood of the true cross and the relics of apostles and early martyrs, become common and accessible to an astonishing degree, but the most puerile and even ridiculous objects were presented as fitting symbols for veneration from their association with some saint or martyr, and were credited with the most astounding miracles. Such abuses have been greatly modified since the Reformation.

Relief (re-lēf'), in sculpture and architecture, is the projection of a figure above or beyond the surface upon which it is formed. According to the degree of projection a figure is described as in *high*, *middle*, or *low relief*. High relief (*alto-rilievo*) is that in which the figures project at least one-half of their apparent circumference from the surface upon which they are formed; low relief (*basso-rilievo*) consists of figures raised but not detached from a flat surface; while middle relief (*mezzo-rilievo*) lies between these two forms. See *Bas-relief*, *Alto-rilievo*.

Religion (re-lij'un), the feeling of reverence which men entertain towards a Supreme Being or to any order of beings conceived by them as demanding reverence from the possession of superhuman control over the destiny of man or the powers of nature; more especially the recognition of God as an object of worship, love, and obedience. Religion denotes the influences and motives to human duty which are found in the character and will of the deity, while morality, in its ordinary sense, is concerned with man's duty to his fellows. As distinguished from *theology*, religion is subjective, inasmuch as it relates to the feelings; while theology is objective, as it denotes the system of beliefs, ideas, or conceptions which man entertains respecting the God whom he worships. Religion in one sense of the word, according to Max Müller, is a mental faculty by means of which man is enabled to apprehend the Infinite under different names and under varying disguises, and this independent of, or even in spite of, sense and reason; being also a faculty which distinguishes man from the brutes. Another, and a very common use of the term, applies it to a body of doctrines handed down by tradition, or in canonical books, and accompanied by a certain outward system of observances or acts of worship. In this sense we speak of the Jewish, the Christian, the Hindu, etc., religions. Religions in this sense are divided into two great classes, polytheistic and monotheistic; that is, those recognizing a plurality of deities and those that recognize but one. (See *Polytheism*, *Monotheism*.) A dualistic class may also be established, in which two chief deities are recognized, and a *henotheistic*, in which there are one chief and a number of minor deities. In some religions magic, fetishism, animal worship, belief in ghosts and demons, etc., play an important part. The most remarkable religious conquests in history are that of Judaism, which effected the establishment of a national religion, originally that of a single family, in a hostile territory by force of arms and expulsion or extinction of the previous inhabitants; that of Christianity, which, by the power of persuasion and in the midst of persecution, overthrew the polytheism of the most enlightened nations of antiquity; that of Mohammedanism, which, partly by persuasion, but more by force, established itself on the site of the eastern empire of Christianity, and extended its sway over a population partly idolatrous and partly Christian; and that of Buddhism, which, being expelled by persecution or otherwise from India, where it had widely disseminated itself by conversion, spread itself by

"THE WINDMILL" BY REMBRANDT

This famous painting was sold by Lord Lansdowne to P. A. B. Widener, of Philadelphia, for a reputed price of $500,000. It is one of the most noted of Rembrandt's landscapes, in which the painter as a rule aims at grandeur and poetical effect. In "The Windmill" a weird effect is given by its glow of light and darkening shadows.

moral suasion over the larger portion of Eastern Asia. All these religions, with the exception of Buddhism, which may perhaps be considered atheistic, are monotheistic systems.

Various estimates have been made of the diffusion of the various religious creeds over the world. These are necessarily very loose and often differ widely from each other. A recent estimate is the following: —

Roman Catholics, ...	230,000,000
Protestants, ...	150,000,000
Eastern Churches, ...	100,000,000
Mohammedans, ...	180,000,000
Buddhists, ...	150,000,000
Brahmanists, ...	200,000,000
Followers of Confucius,	260,000,000
Tavists, ...	43,000,000
Shinto Religion, ...	14,000,000
Jews, ...	10,000,000

Religion, ESTABLISHED, the form of religion recognized as national in a country. See *Established Church.*

Religious Liberty, or LIBERTY OF CONSCIENCE, is the recognition and assertion by the state of the right of every man, in the profession of opinion and in the outward forms and requirements of religion, to do or abstain from doing whatever his individual conscience or sense of right suggests. Religious liberty is opposed to the imposition by the state of any arbitrary restrictions upon forms of worship or the propagation of religious opinions, or to the enacting of any binding forms of worship or belief. The limit of religious liberty is necessarily the right of the state to maintain order, prevent excesses, and guard against encroachments upon private right. In the organization of civil and ecclesiastical government which prevailed from Constantine to the Reformation persecution extended to all dissenters from the established creed, and universal submission to the dominant church became the condition of religious peace throughout Christendom, religious liberty being unknown. The contest of opinion begun at the Reformation had the effect of establishing religious liberty, as far as it at present exists, but the principle itself was so far from being understood and accepted in its purity by either party that it hardly suggested itself even to the most enlightened reasoners of that age. In Great Britain even, civil liberty, jealously maintained, was not understood, by the dominant party at least, to impart religious liberty. Active measures of intolerance were adopted against Dissenters in the reign of Queen Anne. Even in the reign of George III conditions were attached to the toleration of Dissenting preachers; and civil enactments against Roman Catholics have been repealed only within the nineteenth century. Religious liberty was introduced in Prussia by Frederick the Great, but contravened by his immediate successor. The state at present in Prussia, without, perhaps, actually dictating to private individuals, maintains a vigilant control over ecclesiastical organization, the education of the clergy, and all public matters connected with religion. Religious liberty has only been established in Austria by statutes of 1867-68. Italy first enjoyed the same advantage under Victor Emmanuel II. The government of France, ever since the revolution, has always been of a paternal character, and practically religious liberty is limited there. In Spain, at one time the most despotic state in Europe, restricted liberty of worship was allowed in 1876. Religious persecution was actively conducted against the Roman Catholics in Russia during the reign of the emperor Nicholas, and full religious liberty does not yet exist. Since the Crimean war religious liberty has been recognized in Turkey. Toleration has thus been slowly advancing in Europe since the Reformation, and its recent progress has been extensive; yet even in the most advanced countries the state of public opinion on this subject is still far from being satisfactory. In the United States religious liberty has always been recognized, and in this sense it is the freest nation on the earth.

Reliquary (rel-i-kwar'i). a box or casket in which relics are kept. See *Relics.*

Remainder (re-mān'dėr). in law, is a limited estate or tenure in lands, tenements, or rents, to be enjoyed after the expiration of another particular estate.

Rembang (rem-bäng'), a town of Java, in the province of same name, 60 miles W. N. W. of Samarang. Its harbor is one of the best in the island; it has a good trade in ship-timber and in ship-building, and near it are valuable salt-pans. Pop. 14,000.

Rembrandt (rem'brant), in full, REMBRANDT HERMANSZ VAN RYN, the most celebrated painter and etcher of the Dutch school, was born June 15, 1606, at Leyden, where his father was a well-to-do miller. Early displaying a passionate love for art, he received instructions from Van Swanen-

burch of Leyden, a painter of little note, and afterwards studied in Amsterdam under Pieter Lastman. But he soon returned home, and pursued his labors there, taking nature as his sole guide, and confining himself to delineations of common life. In 1630 he removed to Amsterdam, which he never left again. In 1634 he married Saskia van Uilenburg, daughter of the burgomaster of Leeuwarden. Rembrandt has rendered her famous through numerous etched and painted portraits. She died in 1642. Rembrandt became the master of numerous pupils, Gerard Douw being among the number. His paintings and etchings were soon in extraordinary demand, and he must have acquired a large income by his work, but his expenditure seems to have been greater; and in 1656 he was declared bankrupt, his property remaining in the hands of trustees till his death. This took place at Amsterdam in 1669.

Rembrandt Van Ryn.

He had married a second time, but the second wife's name is not known. Rembrandt excelled in every branch of painting, and his treatment of light and shade has never been surpassed. His works display profound knowledge of human nature, pathos, tragic power, humor, and poetic feeling. His eminence in portraiture may especially be noted, in portrait-groups in particular. His artistic development may be broadly divided into three periods. To the first of these (1627-39), which shows less mastery than the succeeding two, belong his *St. Paul, Samson in Prison, Simeon in the Temple, Lesson in Anatomy* (Tulp, the anatomist), and various character portraits of his wife as *Queen Artemisia, Bathsheba, The Wife of Samson*, etc. To his middle period (1640-54) belong *The Night Watch, The Woman Taken in Adultery, Tobit and His Wife, The Burgomaster and His Wife, Descent from the Cross, Portrait of Coppenol, Bathsheba*, and *Woman Bathing.* Among the works of his last period (1655-68) may be mentioned *John the Baptist Preaching, Portrait of Jan Six, The Adoration of the Magi, The Syndics of Amsterdam*, and various portraits of himself. His etchings in technique and deep suggestion have not yet been equaled. He was the first and as yet the greatest master of this department of art. Some of them have been sold at large prices — *Jesus Healing the Sick*, known as the Hundred-guelder Piece (1st state), having been sold at the Buccleuch sale in 1887 for 1300 guineas; and two others, a Coppenol and *Jesus Before Pilate*, bringing 1190 and 1150 guineas respectively. Their existing values are much greater than this. Of his works there are about 280 paintings and 320 etchings extant and accessible, dating from 1625 to 1668.

Remigius (rē-mij'yus), the name of three eminent French ecclesiastics, the most famous of whom (St. Remigius or St. Remy) was bishop of Rheims for over seventy years, and in 496 baptized Clovis, king of the Franks, and founder of the French monarchy.

Remington (rem'ing-ton), Frederick, author and sculptor, born in St. Lawrence Co., New York, in 1861. He is best known in sculpture for his faithful delineations of western scenes, *The Broncho Buster* and *The Wounded Bunkie.* His works embrace *Pony Tracks, Crooked Trails, Frontier Sketches*, etc. Died 1909.

Remington, Philo, inventor, born at Litchfield, New York, in 1816; died in 1889. For 25 years he was superintendent in the small arms factory of his father, and by his inventive skill perfected the Remington breech-loading rifle and the Remington typewriter.

Remiremont (rė-mēr-moṇ), a town of France, department of the Vosges, picturesquely situated at the foot of the Vosges, on the left bank of the Moselle. It is famous for its ancient abbey, and has manufactures of muslin, lace, etc., with a considerable trade, principally in cheese. Pop. 8582.

Remittent Fever (re-mit'tent), a fever which suffers a decided remission of its violence during the course of the twenty-four hours, but without entirely leaving the patient. It differs from an intermittent fever in this, that there is never a total absence of fever. Remittent fever is

severe or otherwise according to the nature of the climate in which the poison is generated. The autumnal remittents of temperate climates are comparatively mild, while the same fever in the tropics is often of a very severe type, and not unfrequently proves fatal. The period of remission varies from six to twelve hours, at the end of which time the feverish excitement increases, the exacerbation being often preceded by a feeling of chilliness. The abatement of the fever usually occurs in the morning; the principal exacerbation generally takes place towards evening. The duration of the disease is generally about fourteen days, and it ends in a free perspiration, or may lapse into a low fever. This fever is often cured by the administration of quinine, which should be given at the commencement of the remission. A simple yet nourishing diet must also be attended to. No stimulants must be allowed.

Remo, San. See *San Remo.*

Remon'strants. See *Arminians.*

Remora (rem'u-ra), a genus of fishes included in the Goby family, and of which the common remora (*Echenēis remŏra*), or sucking-fish, is the typical example. These fishes have on the top of the head a peculiar sucking-disk, composed of a series of cartilaginous plates arranged transversely, by means of which they attach themselves to other

Remora (*Echenēis remŏra*).

fishes or to the bottoms of vessels. The common remora attains an average length of one foot and possesses a general resemblance in form to the herring. It is common in the Mediterranean Sea and in the Atlantic Ocean. Other species are of larger size. The ancients attributed to the remora the power of arresting and detaining ships in full sail.

Remscheid (rem'shīt), a town of Rhenish Prussia, 18 miles E. S. E. Düsseldorf, mostly on a rugged height. It is the chief seat of the German hardware industry. Pop. 64,340.

Remsen (rem'sen), Ira, chemist, born at New York in 1846. He was graduated in the N. Y. College of Physicians and Surgeons, was professor of chemistry at Williams College 1872-76, and at Johns Hopkins University after 1876. In 1901 he succeeded Daniel E. Gilman as president of the latter institution. He wrote numerous text books, including *The Principles of Theoretical Chemistry, Inorganic Chemistry,* and *Chemical Experiments.*

Remus. See *Romulus.*

Rémusat (rā-mů-zä), Charles François Marie, Comte de, politician and man of letters, was born at Paris in 1797; died in 1875. He was educated at the Lycée Napoléon, and entered life as a journalist and lawyer. He was a member of the Chamber of Deputies from 1830 to 1848, was minister of the interior for a few months in 1840, and minister of foreign affairs in 1871-73, in both cases in the cabinet of M. Thiers. During the second empire he lived in retirement, devoting himself chiefly to literary pursuits. His works include several on English subjects, such as *L'Angleterre au XVIII Siècle* (1856), *Bacon* (1857), *Lord Herbert of Cherbury* (1874), *Histoire de la Philosophie en Angleterre depuis Bacon jusqu'à Locke* (1875).— His mother, Claire Elizabeth de Vergennes, Comtesse de Rémusat (born in 1780; died in 1824), was a very remarkable woman. Her essay on *Female Education,* published after her death, received an academic *couronne,* and her *Mémoires,* published in 1879-80, are particularly valuable for the light which they throw on the court of the first empire.

Rémusat (rā-mů-zä), Jean Pierre Abel, a French orientalist, born in 1788. He studied medicine, but devoted himself principally to the study of Eastern languages, especially Chinese. In 1811 appeared his *Essai sur la Langue et la Littérature Chinoises,* which attracted the attention of the learned. In 1814 he was appointed professor of Chinese and Manchu at the Collège de France, a chair established specially for him. He died in 1832.

Renaissance (re-nā'sạns), a term applied, in its more specific sense, to a particular movement in architecture and its kindred arts, but in a general sense to that last stage of the middle ages when the European races began to emerge from the bonds of ecclesiastical and feudal institutions, to form distinct nationalities and languages; and when mediæval ideas became largely influenced by the ancient classical arts and literature. It was a gradual

transition from the middle ages to the modern, characterized by a revolution in the world of art and literature brought about by a revival and application of antique classical learning. The period was also marked by a spirit of exploration of lands beyond the sea, by the extinction of the scholastic philosophy, by the new ideas of astronomy promulgated by Copernicus, and by the invention of printing and gunpowder, etc.

Renaissance Architecture, a style which originated in Italy in the first half of the fifteenth century, and afterwards spread over Europe. Its main characteristic is a return to the classical forms and modes of ornamentation which had been displaced by the Byzantine, the Romanesque, and the Gothic. The Florentine Brunelleschi (died 1446) may be said to have originated the style, having previously prepared himself by a careful study of the remains of the monuments of ancient Rome. His buildings are distinguished by the use of the three classical orders, with much of the classical severity and grandeur, but in design they are made conformable to the wants of his own age. He sometimes retains, however, elements derived from the style which he superseded; as for instance in his masterpiece, the cathedral of Florence, where he makes a skilful use of the pointed Gothic vault. From Florence the style was introduced into Rome, where the noble and simple works of Bramante (died in 1514) are among the finest examples of it, the chief of these being the palace of the Chancellery, the foundations of St. Peter's, part of the Vatican, the small church of San Petro in Montorio. It reached its highest pitch of grandeur in the dome of St. Peter's, the work of Michael Angelo (died in 1564), after whom it declined. Another Renaissance school arose in Venice, where the majority of the buildings of the sixteenth and seventeenth centuries are distinguished by the prominence given to external decoration by means of pillars and pilasters. From this school sprung Palladio (1518-80), after whom the distinctive style of architecture which he followed received the name of Palladian. The Renaissance architecture was introduced into France by Lombardic and Florentine architects about the end of the sixteenth century, and flourished there during the greater part of the following century, but especially in the first half under Louis XII and Francis I. The early French architects of this period, while adopting the ancient classical orders and other features of the new style, still retained many of the features of the architecture of the preceding ages; later on they followed classical types more closely, as in the palace of the Louvre. As applied to ecclesiastical edifices, the Renaissance style of architecture is charged in France as elsewhere with depriving them of religious character. Towards the end of the sixteenth century the Renaissance style degenerated in France as it had done in Italy, and after passing through the degenerate phase known as the Baroque style, it gave rise to the insipid and overdecorated productions of the so-called Rococo style. Into England the Renaissance style was introduced during the time of Elizabeth, and it is there represented by the works of Inigo Jones (1572-1652), Sir C. Wren (1632-1723), and their contemporaries, St. Paul's, London, being a grand example of the latter architect. A great many of the princely residences of Germany belong to the Renaissance style, but not to its best period. Renaissance architecture presents many phases and varieties of style. It has been much used in modern work. The prevailing style employed in the rebuilding of Paris is Renaissance.

Renaix (rē-nā; Flemish, *Ronse*), a town in Belgium, province of East Flanders, 24 miles south of Ghent; has manufactures of thread, lace, linen and woolen cloth, tobacco, etc. Renaix dates from the eighth century. Pop. (1904) 20,760.

Renan (rē-nän), Joseph Ernest, orientalist, historian, and essayist, was born at Tréguier, in Brittany, Feb. 27, 1823, and studied at the seminary of St. Sulpice, Paris, but in 1845 gave up all intention of becoming a priest, and devoted himself to historical and linguistic studies, especially the study of oriental languages. In 1848 he obtained the Volney prize for an essay on the Semitic languages. In 1849 he was sent by the Academy of Inscriptions and Belles Lettres on a mission to Italy, and in 1860 on a mission to Syria. In 1862 he was appointed professor of Hebrew, Chaldee, and Syriac in the Collège de France, but the skeptical views manifested in his *Vie de Jésus* (1863) raised an outcry against him, and he was removed from his chair, to be restored again, however, in 1871. This work, the publication of which caused intense excitement throughout Europe, was the first part of a comprehensive work on the *History of the Origins of Christianity*, which includes *Les Apôtres* (1866), *St. Paul* (1867),

L'Antéchrist (1873), *Les Evangiles* (1877), *L'Église Chrétienne* (1879), and *Marc Aurèle* (1880), all written from the standpoint of one who disbelieves in the supernatural claims of Christianity. Renan's latest important work is the *History of the People of Israel till the Time of King David.* Other works are *Histoire Générale et Système Comparé des Langues Sémitiques*, and *Études d'Histoire Religieuse.* He became a member of the Academy in 1878. Died October 2, 1892.

Renard the Fox (ren'ard), the name of an epic fable in which the characters are animals, the fox being the hero, and which in various forms was extremely popular in Western Europe during the middle ages, and for many years afterwards. It is known in several forms, differing from each other in the episodes. In Latin it appears in a poem of considerable length belonging to about 1150; the oldest known German version is that of a minnesinger, Heinrich der Glichesære, belonging to a period not much later. An excellent Dutch version of the fable appeared in Flanders about 1250, under the title *Reinaert de Vos* ('Renard the Fox'), and this subsequently received modifications and enlargements. In 1498 a version in Low German, probably by Herman Barkhusen, a printer of Rostock, appeared. It was evidently taken from the prose version in Dutch, of which Caxton published an English translation. On this Low German version was founded Goethe's rendering (1794) into modern German hexameters. In France the history of Renard was enormously popular, and from the end of the twelfth to the middle of the fourteenth centuries many forms of it appeared. It relates the adventures of the fox at the court of the king of beasts, the lion, and details with great spirit and humor the cunning modes in which the hero contrives to outwit his enemies, and to gain the favor of his credulous sovereign. The poem may be regarded as 'a parody of human life.' There is no personal satire in it, but the allusions to the weak points in the social, religious, and political life of the time are numerous and unmistakable.

Rendsburg (rents'börg), a town of Prussia, in the province of Schleswig-Holstein, on the Eider, 54 miles N. N. W. of Hamburg. It is advantageously situated for trade, being connected with the North Sea by the Eider, and with the Baltic by the Eider Canal, and being on the line of the Kaiser Wilhelm canal. It has a thirteenth century church and a quaint old townhall. Pop. (1905) 15,577.

René (rė-nā'), or RENA'TUS I of Anjou, titular king of Naples, second son of Louis II of Naples, duke of Anjou, and Iolante, daughter of John, king of Aragon, was born at Angers in 1409. Having in 1420 married Isabella, daughter of Charles II, duke of Lorraine, on the death of his father-in-law in 1431 he laid claim to that dukedom; but Count Antony of Vaudemont, son of the brother of Charles II, contested his right, drove him out of Lorraine, captured him, and held him a prisoner for several years. In 1434 his elder brother, Louis III of Anjou, who had been in actual possession of the throne of Naples and Sicily, died and left to him Provence, Anjou, Naples, Sicily, and Jerusalem. In 1437 René bought his liberty and the acknowledgment of his right to Lorraine for 400,000 florins, and in the following year he led an army to Naples, where his claims were disputed by Alfonso, king of Aragon. René was unsuccessful, and in 1442 returned to Lorraine, the government of which he gave up to his son John, who, after his mother Isabella's death, entered into full possession under the title of John II. On this René retired into Provence, and devoted himself to agriculture, manufactures, literature, and art. His subjects called him the Good, and his court was the resort of poets and artists. His closing years were spent in the company of his daughter Margaret, the exiled queen of Henry VI of England. His sons having all died before him, he made a will in favor of Louis XI of France, and at his death, which took place at Aix in 1480, most of his possessions fell to the French crown.

Renfrew (ren'frū), or RENFREWSHIRE, a county of Scotland, bounded by Ayrshire, Lanarkshire, Dumbartonshire, and the river and Firth of Clyde; area, 240 sq. miles. The surface is uneven, the highest point being about 1300 feet above sea level. Its principal rivers are the White Cart, Black Cart and Gryffe. The southeast part of the country is included in the great coal district of the west of Scotland. Good freestone for building is quarried. Renfrewshire derives its principal importance from its manufactures and shipping, including as it does Paisley, Greenock, and Port-Glasgow, as well as the county town, Renfrew. Pop. 268,900.— The town of Renfrew is an ancient royal and parliamentary burgh, 6 miles W. N. W. of Glasgow, close to the

Clyde. In 1404 it gave the title of baron to the heir-apparent to the Scottish throne, a title still borne by the Prince of Wales. The principal industries are iron shipbuilding, engineering, and iron-founding. Pop. 9297.

Reni. See *Guido Reni.*

Rennell (ren'el), JAMES, an English geographer, born in 1742; died in 1830. At thirteen he entered the navy, whence he passed into the East India Company's military service, in which he rose to the rank of major. He was chiefly employed in engineering and surveying work, and later held the appointment of surveyor-general of Bengal. He retired on a pension in 1776, returned to England in 1778, and henceforth lived in London. The remainder of his long life he devoted to geographical labors, maintaining a correspondence with many of the most learned men of Europe, and giving to the world from time to time numerous geographical works of great value. These include *Bengal Atlas*, *Memoir of a Map of Hindustan*, *Geographical System of Herodotus*, *Treatise on the Comparative Geography of Western Asia*, *On the Topography of the Plain of Troy*, *Illustrations of the Expedition of Cyrus*, etc.

Rennes (renn), a city of France, formerly capital of Brittany, at present capital of the department of Ille-et-Vilaine, situated at the confluence of the rivers Ille and Vilaine. It is traversed from east to west by the Vilaine, which divides it into the High and the Low Town, and is crossed by four bridges. The High Town is handsome and regular, having been rebuilt after a dreadful conflagration which took place in 1720. The most remarkable buildings are the cathedral, a modern Grecian building, the Palais de Justice, the Hôtel de Ville, and the Lycée. The industries include sail-cloth, linen, shoes, hats, stained paper, etc. Rennes is the seat of an archbishop, the headquarters of a corps d'armée, and has a large arsenal and barracks. Duguesclin and Sainte Foix were born here. Pop. 62,024.

Rennet (ren'et), the prepared inner surface of the stomach of a young calf. It contains much pepsin, and has the property of coagulating the casein of milk and forming curd. It is prepared by scraping off the outer skin and superfluous fat of the stomach when fresh, keeping it in salt for some hours, and then drying it. When used a small piece of the membrane is cut off and soaked in water, which is poured into the milk intended to be curdled.

Rennet, or REINETTE, a kind of apple, said to have been introduced into England in the time of Henry VIII. It is much grown in France and Germany. The rennet is highly esteemed as a dessert fruit.

Rennie (ren'nē), GEORGE, civil engineer, eldest son of John Rennie (see next article), was born in Surrey in 1791, and was educated at St. Paul's School, London, and at Edinburgh University. In 1811 he became associated with his father in business, and on his father's death he formed a partnership with his brother John, and afterwards with his two sons. He constructed many of the great naval works at Sebastopol, Nicolaiev, Odessa, Cronstadt, and in the principal ports of England, and executed several English and continental railways. He died in 1866.

Rennie, JOHN, a celebrated civil engineer, son of a farmer, was born at Phantassie, East Lothian, in 1761, and was educated at Dunbar and Edinburgh, where he attended the lectures of Dr. Robinson and Dr. Black on natural philosophy and chemistry. He labored for some time after this as a workman in the employment of Andrew Meikle, a millwright. In 1780 he went to Birmingham, with letters of introduction to Messrs. Boulton and Watt at Soho, near that city, and by that firm he was afterwards employed in London in the construction of machinery for the Albion flour mills, near Blackfriars Bridge. In London his reputation rapidly increased, until he was regarded as standing at the head of the civil engineers of Great Britain. Numerous bridges, canals, docks, and harbors bear testimony to his skill: among them, Southwark Bridge, Waterloo Bridge, and London Bridge across the Thames; the government dockyards at Portsmouth, Chatham, Sheerness, and Plymouth, the London docks, the pier at Holyhead, etc. He died in 1821. His sons George (see above) and John were associated with him in business, and afterwards with each other. John (1794-1874) succeeded his father in building the London Bridge, and on its opening in 1831 he was knighted. He was a high authority in hydraulic engineering.

Reno, a city, capital of Washoe Co., Nevada, on the Truckee River, about 20 miles N. W. of Virginia City. It has large reduction works and various manufactures, and is the seat of the

state university and state insane asylum. Pop. 10,867.

Rensselaer (ren'sel-er), formerly known as Greenbush, a city of Rensselaer Co., New York, on the Hudson, opposite Albany. It has felt mills, color works, coal elevator and chain mills, railroad and machine shops, pork packing establishments, etc. Pop. 10,711.

Rent, in the strict economic sense, the payment which, under conditions of free competition, an owner of land can obtain by lending out the use of it to others. This will be found to consist of that portion of the annual produce which remains over and above the amount required to replace the farmer's outlay, together with the usual profits. The explanation of the existence of a permanent surplus in the product beyond what is thus needed to replace with profits the productive outlay was first given by Anderson in 1777, the theory being developed more at length by Ricardo, with whose name it is commonly associated. In Adam Smith's opinion, the demand of food is always so great that agricultural produce can command in the market a price more than sufficient to maintain all the labor to bring it to market and to replace stock with its profits, the surplus value going naturally to the landlord. As against the insufficiency of this statement to meet the central difficulty in the problem, the Ricardian school of economists pointed out that agricultural produce is raised at greater or less cost according to the degree of fertility of different soils, and that even on the same soil, by the law of diminishing returns, a more than proportionate outlay is, after a certain point, required for each additional increase in the produce. The uniform price of agricultural produce, however, as determined in a free market, tends inevitably to be such as to cover with ordinary profits the cost of that portion of the produce which is raised at greatest expense; and there will, therefore, be on all that portion of the produce raised at less expense a surplus over and above what is required to remunerate the farmer at the usual rate of profits. As a corollary to this theory, it will be apparent that rent does not determine the normal value of produce, but is itself determined by it; in other words, that rent is not an element in the cost of production. The Ricardian theory of rent has been frequently called in question, as by Rogers in England and Carey in America; but it has obtained, with certain obvious limitations in respect of the conditions of land tenure, the assent of the majority of modern economists.

Rent, as a legal term, is the consideration given to the landlord by a tenant for the use of the lands or buildings which he possesses under lease. There is no necessity that this should be, as it usually is, money; for horses, corn, and various other things, may be, and occasionally are, rendered by way of rent; it may also consist in manual labor for the landlord's benefit. It is incidental to rent that the landlord can distrain — that is, seize and sell the tenant's chattels in order to liquidate the rent. Sometimes the owner transfers to another by deed or otherwise the right to a certain rent out of the lands, that is termed a *rent-charge*, and the holder of it has power to distrain for the rent, though ordinarily he has no right over the lands themselves.

Renwick (ren'wik), James, a Scottish Covenanter, born at Minnihive, Dumfriesshire, in 1662. He studied at Edinburgh University, where, on declining to take the oath of allegiance, he was refused a degree. On the advice of the Covenanters, with whom he threw in his lot after the execution of Cargill in 1681, he went to Holland, and was ordained at Groningen, immediately returning to Scotland, and engaging in the difficult and dangerous duties of a minister of the 'hill-folk.' On the proclamation of James II in 1685 he went with 200 men to Sanquhar, and published a declaration disowning him as a papist, and renouncing his allegiance. A reward was then set upon his head, and after many wonderful escapes he was captured, condemned, and executed, Feb, 17, 1688.

Renwick, James, physicist, born at Liverpool in 1792; died at New York in 1863. He was educated in Columbia College, New York, and from 1820 to 1850 was professor of physics and chemistry in that institution. He wrote a number of works connected with the sciences in which he had to give instruction, such as *Outlines of Natural Philosophy; Treatise on the Steam Engine; Elements of Mechanics*, etc.; also *Life of John Jay and Alexander Hamilton; Life of De Witt Clinton;* besides editing various other works.— His son James, born 1819, became a distinguished architect, designing many churches and other buildings, including the Roman Catholic cathedral of New York, the Smithsonian Institution, Vassar College, etc.

Rep, or Repp, a woolen dress fabric with a finely-ribbed surface, so

woven that the ribs run transversely and not lengthways as in corded fabrics.

Repairs (re-pārz'), in law, is the term denoting the repairs done to a house or tenement by the landlord or tenant during the currency of a lease. In England, unless there is an express stipulation to the contrary, repairs must be performed by the tenant; but it is usually stated in the lease which party is to do the repairs. In the United States, unless otherwise stipulated, repairs are made by the landlord; he must keep the property in tenantable condition.

Repeal Movement (re-pēl'), the name given to the agitation for the repeal of the Union between Great Britain and Ireland. This agitation commenced almost at the moment of the Union, and has continued to the present time. Robert Emmet sacrificed his life to the cause of repeal in 1803. But the word repeal is most intimately connected with the name and career of Daniel O'Connell, the Irish 'Liberator.' O'Connell died in 1847, and the cause of repeal was taken up by the Young Ireland party of 1848; by the Fenians, whose operations came to a head in 1865-67; and finally by the Home Rule party, organized under the leadership first of Isaac Butt, in 1870, and afterwards under the leadership of C. S. Parnell. During the celebrated Parnell Commission of 1888-89, however, the Home Rule party, through their counsel, disclaimed all desire for repeal, maintaining that their aims were confined to the obtaining of Home Rule in the strict, or restricted, sense of the word. Home Rule continues the aim of the Irish leaders in Parliament, and there are at present strong hopes of its establishment.

Repeat (re-pēt'), in music, a sign that a movement or part of a movement is to be played or sung twice.

Repeater Watch, a watch that repeats the hour, striking the hour, or hour and quarters, or even the hour, quarters, and odd minutes on the compression of a spring.

Repeating Pistol. See *Revolver.*

Replevin (re-plev'in), in English law, is an action brought to recover possession of goods illegally seized, the validity of which seizure it is the regular mode of contesting.

Replica (rep'li-ka), in the fine arts, is the copy of a picture, etc., made by the artist who executed the original.

Reporting (re-pōr'ting), is the process by which legislative debates and other public addresses are made known to the public. Previous to the year 1711 no regular publication of reports can be said to have been made. After 1711 speeches in the British Parliament, reproduced from notes furnished sometimes by the members themselves, began to appear regularly in periodicals. *Boyer's Historical Register*, an annual publication, gave a pretty regular account of the debates from the accession of George I to the year 1737. In 1735 the *Gentleman's Magazine* began a monthly publication of the debates, the names of the speakers being suppressed, with the exception of the first and last letters; but the reports were necessarily very inaccurate, as may be judged from the manner in which they were prepared. Cave, the bookseller, and his assistants gained admission to the houses of parliament, and surreptitiously took what notes of the speeches they could, and the general tendency and substance of the arguments; this crude matter was then brought into shape for publication by another hand — work upon which Guthrie the historian and Dr. Johnson were employed. In 1729, and again in 1738, the House of Commons had characterized the publication of debates as 'an indignity to, and a breach of the privilege of this house,' and in 1747 Cave was called to account; but the reports continued to appear without the proper names of the speakers, and under the heading of 'Debates in the Senate of Lilliput.' In 1771 several printers were ordered into custody for publishing debates of the House of Commons. The sympathy of the public was with the printers, the lord mayor and Alderman Oliver were committed to the Tower for refusing to recognize the Speaker's warrant for the arrest of the printers, and the popular excitement was intense; but in 1772 the newspapers published the reports as usual, and the House quietly gave up the struggle. Thenceforth the system of reporting parliamentary debates gradually developed till it reached its present very perfect condition. For a long time it was considerably hampered by the want of any special place in the house for the reporters; but in the new houses of parliament special galleries and rooms have been fitted up for them, and all necessary conveniences provided. The system quickly extended from England to the United States, in the Congress of which no restriction was laid upon reporters. *Verbatim* reports of the proceedings in the Senate and House of Representatives are taken daily in shorthand dur-

ing the sessions by an official corps of reporters and printed in the *Congressional Record*. The newspapers have their reporters also at hand to take down matters of interest to the general public, and the art of reporting has extended in this country until it covers lectures, debates and public speeches of every kind. Every newspaper has a corps of reporters devoted to these various duties, and nowhere else in the world is there such enterprise and activity shown in the gathering of news of this character as in the United States.

Reports (re-pōrts'), in regard to courts of law, are statements containing a history of the several cases, with a summary of the proceedings, the arguments on both sides, and the reason the court gave for its judgment. In England reports of law cases are extant from the reign of Edward II. Up to the time of Henry VIII the reports were taken officially at the expense of the government, and were published annually under the name of Year-books; but afterwards, until 1865, the reports were made by private individuals in the various courts. In 1865 an improved system of law reporting was instituted by the English bar under the superintendence of the Council of Law Reporting, who publish the 'authorized reports.' In the United States the Supreme Court Reports form a complete series from 1792 to date. Each State also publishes a regularly authorized series of Reports of decisions of its judicial tribunals of last resort.

Repoussé (rė-pö'sā), a kind of ornamental metal-work in relief. It resembles embossed work, but is produced by beating the metal up from the back, which is done with a punch and hammer, the metal being placed upon a wax block. By this means a rude resemblance to the figure to be produced is formed, and it is afterwards worked up by pressing and chasing the front surface. The finest specimens of this style are those of Benvenuto Cellini of the sixteenth century.

Representative Government (rep-re-zen'ta-tiv), is that form of government in which either the whole of a nation, or that portion of it whose superior intelligence affords a sufficient guarantee for the proper exercise of the privilege, is called upon to elect representatives or deputies charged with the power of controlling the public expenditure, imposing taxes and assisting the executive in the framing of laws. The most notable example of a government of this kind is that existing in the United States. In Britain only the House of Commons is representative, the House of Lords being composed of hereditary legislators. In the nations of Europe also, except France and Switzerland, the legislative bodies are nowhere fully representative of the people. See *Constitution*.

Reprieve (re-prēv'), the suspension of the execution of the sentence passed upon a criminal for a capital offense. A reprieve may be granted in various ways: — First, by the mere pleasure of the executive; second, when the judge is not satisfied with the verdict, or any favorable circumstance appears in the criminal's character; third, when a woman capitally convicted pleads pregnancy; and, finally, when the criminal becomes insane.

Repri'sal, Letters of. See *Marque, Letters of*.

Reprobation (rep-ru-bā'shun), in theology, is the doctrine that all who have not been elected to eternal life have been reprobated to eternal damnation. This doctrine was held by Augustine and revived by Calvin; but most modern Calvinists repudiate it in the sense usually given to it.

Reproduction (rē-pru-duk'shun), the process by which animals perpetuate their own species or race. Reproduction may take place in either or both of two chief modes. The first of these may be termed *sexual*, since in this form of the process the elements of sex are concerned — male and female elements uniting to form the essential reproductive conditions. The second may be named *asexual*, since in this latter act no elements of sex are concerned. The distinctive character of sexual reproduction consists in the essential element of the male (*sperm-cell* or *spermatozoön*) being brought in contact with the essential element of the female (*germ-cell*, *ovum*, or *egg*), whereby the latter is fertilized or impregnated, and those changes thereby induced which result in the formation of a new being. Whether these elements, male and female, be furnished by one individual or by two — or in other words whether the sexes be situated in separate individuals or not — is a fact of immaterial consequence in the recognition and definition of the sexual form of the process. The reproductive process, therefore, may be (I) *Sexual*, including (A) Hermaphrodite or Monœcious parents possessing male and female organs in the same individual, and these may be (*a*) self-impregnating (for example, the tapeworm), or (*b*) mutually impregnating

(for example, the snail); and (B) Diœcious parents, which may be (1) Oviparous (for example, most fishes, birds, etc.), (2) Ovo-viviparous (for example, some amphibians and reptiles), or (3) Viviparous (for example, mammals). Or the reproductive process may be (II) *Asexual*, including the processes of (A) Gemmation or budding (internal, external, continuous, or discontinuous), and (B) Fission (transverse, longitudinal, irregular).

The most perfect form of the reproductive process is best seen in the highest or vertebrate animals, where the male elements are furnished by one individual and the female elements by another. The male element, with its characteristic sperm-cells or spermatozoa, is brought into contact with the female ova in various ways. The ova when impregnated may undergo development external to the body of the parent, and be left to be developed by surrounding conditions (as in the eggs of fishes); or the parent may (as in birds) incubate or hatch them. Those forms which thus produce eggs from which the young are afterwards hatched are named *oviparous* animals. In other cases (as in the land salamanders, vipers, etc.) the eggs are retained within the parent's body until such time as the young are hatched, and these forms are hence named *ovo-viviparous;* while (as in mammalia) the young are generally completely developed within the parent's body, and are born alive. Such animals are hence said to be *viviparous.* In the higher mammals, which exhibit the viviparous mode of reproduction in fullest perfection, the mother and embryo are connected by a structure consisting partly of fœtal and partly of maternal tissues, and which is known as the *placenta.* (See *Placenta.*) In the tapeworms we find familiar examples of normal hermaphrodite forms. Each segment or *proglottis* of the tapeworm — which segment constitutes of itself a separate zoöid or part of the compound animal — contains a large branching ovary, developing ova or eggs, and representing the female organs, and also the male organ or testis. These organs between them produce perfect or fertilized eggs, each of which under certain favorable conditions is capable of developing into a new tapeworm. The snails also form good examples of hermaphrodite animals, and illustrate organisms which require to be mutually impregnated in order to produce fertilized eggs — that is to say, the male element of one hermaphrodite organism must be brought in contact with the female element of another hermaphrodite form before the eggs of the latter can be fecundated. See also *Fission, Gemmation, Generation, Ovum, Parthenogenesis,* etc. As to reproduction in plants, see *Botany.*

Reptile (rep'til), or REPTILIA, a class of vertebrates, constituting with the birds, to which they are most closely allied, Huxley's second division of vertebrates, Sauropsida. Reptiles, however, are generally regarded as occupying a separate place in the animal kingdom, between birds and amphibians. Reptiles differ from amphibians chiefly in breathing through lungs during the whole period of their existence; and from birds in being cold-blooded, in being covered with plates or scales instead of feathers, and in the forelegs (as far, at least, as living reptiles are concerned) never being constructed in the form of wings.

The class may be divided into ten orders, four of which are represented by living forms, while six are extinct. The living orders are the Chelonia (tortoises and turtles), the Ophidia (serpents and snakes), the Lacertilia (lizards), and Crocodilia (crocodiles and alligators). The extinct orders are: Ichthyopterygia (Ichthyosaurus), Sauropterygia (Plesiosaurus), Anomodontia (Rhynchosaurus, etc.), Pterosauria (Pterodactylus), Deinosauria (Megalosaurus, etc.), and Theriodontia. The class is also divided into two sections, Squamata and Loricata, according as the exoskeleton consists simply of scales or of bony plates in addition to the scales.

The exoskeleton varies greatly in its development throughout the class. As in the tortoises and turtles and crocodiles it may attain either separately or in combination with the endoskeleton a high development. In serpents and many lizards it is moderately developed, while in some lizards the skin is comparatively unprotected. The skeleton is always completely developed and ossified. The vertebral column in the quadrupedal forms is divided into four or five regions, less distinctly differentiated, however, than in the mammals. The ribs differ considerably in their mode of attachment to the vertebræ, but are always present, and in a state of greater development than in the amphibians. The body, except in the case of the tortoises, is of an elongated form. The limbs are very differently developed in the different species. In the serpents and some lizards they are completely wanting or atrophied; in other lizards they are rudimentary; while in the remainder of the class sometimes the anterior and sometimes the posterior

limbs are developed, and not the others. In no case are the limbs developed to the extent to which they are developed in birds and quadrupeds, these members seldom being of sufficient length to keep the body from the ground. In some of the forms, living or extinct, the limbs are modified for swimming or for flight. The lower jaw is connected with the skull through the intervention of a quadrate bone, and, as this often projects backward, the opening of the mouth is very great, and may even extend beyond the base of the skull. Teeth, except in the turtles and tortoises, are present. but are adapted rather for seizing and holding prey than masticating food, and, except in the crocodiles, are not sunk in sockets. The skull possesses a single occipital condyle, by means of which it articulates with the spine. The brain is small compared with the size of the skull. The muscular system is developed more like that of the birds and mammals than that of the amphibians or fishes. The intestinal tract is generally differentiated into an œsophagus, stomach, small intestine, and large intestine. It terminates in a *cloaca*, which is also common to the efferent ducts of the urinary and generative systems. In some forms (as snakes) the stomach, like the gullet, is capable of great distention. The heart has only three cavities, viz., two separate auricles and a single ventricular cavity, usually divided into two by an incomplete partition. Respiration is always performed by the lungs, which are highly organized, and often attain a great size. The ova are in general retained within the body of the parent until the development of the young has proceeded to a greater or less extent, and then expelled and left to the heat of the sun; but in some forms (as snakes and lizards) they are hatched in the interior of the body. Reptiles are found in greatest number, and in most typical form and variety, in the warm or tropical regions of the earth. During winter, or in the colder seasons of the year, most reptiles hibernate, and snakes are notable as periodically molting their skin or epidermis. See the different orders in separate articles.

Republic (re-pub'lik; Latin, *res publica*, the common weal, the state), a commonwealth in which the supreme power of the state is vested, not in a hereditary ruler, but in the citizens themselves. According to the constitution of the governing body, a republic may vary from the proudest aristocracy to the most absolute democracy. In the small states of ancient Greece the supreme power was vested in the whole body of the citizens, who met in common assembly to enact their laws; though under them was a large slave population devoid of all political rights. In the oligarchic republics of Genoa and Venice the supreme power was consigned to the nobles or a few privileged individuals. In all modern republics the representative system prevails. Besides the diminutive republics of San Marino, in Italy, and Andorra, on the south side of the Pyrenees, the only republics in Europe at the present day are those of Switzerland and France. Switzerland has been a republic ever since it liberated itself from German rule; and France has been thrice a republic — from 1793 to 1804, from 1848 to 1852, and from 1870 to the present time. Holland was a republic from the separation of the seven provinces from Spain until 1815; Great Britain was nominally a republic from 1649 to 1660; Spain possessed a republican government in 1868-69, and in 1873-74. In the New World the republican form of government prevails universally among the independent states, the most important of all the republics there being the United States. The United States, like Switzerland, is a federative republic, consisting of a number of separate states united by a constitution, and having a central government, with power to enact laws binding on all the citizens. The same condition exists in others of the American republics. Mexico has been a republic since 1824, except during the short-lived empire from 1863 to 1867. Brazil has been a republic only since November, 1889.

Republican Party, one of the two leading political parties of the United States. The term was first used shortly after the formation of the Constitution, to replace that of the old Anti-Federalist party, composed of those who were opposed to the adoption of this great state paper. The name Republican was given to the new organization by Thomas Jefferson, who became its leader. During the French Revolution many 'Democratic Clubs' were formed in this country, and during 1794-95 a union was made between these and the Republicans, the compound title of Democratic-Republican being adopted. The Federal party, to which this was opposed, died out after 1816, and the Democratic-Republican party existed alone. After 1824 it became known simply as the Democratic. In 1828 a National Republican party was formed, but this name gradually changed into that of Whig party. The Republican

party now existing in the United States was formed in 1856, out of an organization known as 'Anti-Nebraska Men,' who adopted this title. Into it was merged the remains of the older Whig, Free Soil, American and other minor organizations. The new party advocated a high protective tariff and favored a strong central government, in opposition to the Democratic policy, which opposed the protective tariff and maintained the doctrine of state-rights. The new party also advocated the non-extension of slavery, this also being in opposition to the policy of the Southern and a large section of the Northern Democrats. But the result of the Civil war removed the slavery issue from the domain of party politics and there remained only those of centralization and protection. In the years which have passed since the two parties have in a measure approached each other on these questions and the marked distinction between them has passed away, both of them, for instance, now advocating tariff reduction, though to a different extent. Other issues between the two parties have arisen from time to time, such as that of the gold and silver standard, but at present their difference in policy is far less strongly marked than formerly. The Republican party has been successful in electing all its candidates for the Presidency, except in the elections of 1856, 1884 and 1892.

Repudiation (re-pū-di-ā'shun), a refusal on the part of a government to pay the debts contracted by the governments which have preceded it. Repudiation has sometimes been resorted to by the smaller American republics and by some of the United States, and in Europe there are also instances of a similar kind.

Repulsion (re-pul'shun), in physics, is a term often applied to the action which two bodies exert upon one another when they tend to increase their mutual distance. It is manifested between two magnets when like poles are presented to each other, and by electrified bodies when like charges (positive to positive or negative to negative) are presented. There is no evidence of any other form of physical repulsion existing.

Requena (re-kā'nȧ), a town of Southern Spain, province of Valencia, 41 miles w. of that city; has industries connected with the culture of silk, saffron, grain, fruit and wine. Pop. 16,236.

Requiem (rē'kwi-em), in the Roman Catholic Church, a solemn musical mass for the dead, which begins in Latin, *Requiem æternam dona eis*, ('Give to them eternal rest'). Mozart, Jomelli, and Cherubini composed famous requiems.

Reredos (rēr'dos), in ecclesiastical architecture, a screen or partition wall behind an altar, which is invariably ornamented in some manner, and is frequently highly enriched with sculptured decorations, or with painting, gilding, or tapestry. The reredos of St. Paul's, London, the last English cathedral to be provided with a reredos, was unveiled in January, 1888.

Rescript (rē'skript; Latin, *rescriptus*, written back), in Roman law, the answers of popes and emperors to questions in jurisprudence propounded to them officially; hence an edict or decree. The rescripts of the Roman emperors constitute one of the authoritative sources of the civil law. The rescripts of the popes concern principally theological matters.

Rescue (res'kū), in law, the forcible or illegal taking of a person or thing (as a prisoner or a thing lawfully distrained) out of the custody of the law.

Resection (re-sek'shun), in surgery, the operation of cutting out the diseased part of a bone at a joint. It frequently obviates the necessity of amputating the whole limb, and, by the removal of the dead parts, leaves the patient a limb which, though shortened, is in the majority of cases better than an artificial one. Resection, which is one of the triumphs of modern surgery, became a recognized form of surgical operation in 1850.

Reseda (re-sē'da), a genus of annual, biennial, and perennial herbs and undershrubs, nat. order Resedaceæ, of which it is the type. Of the genus two species are quite familiar: *R. odorāta* (mignonette) and *R. luteŏla* (wild woad). The latter yields a beautiful yellow dye, for which it was formerly cultivated.

Resedaceæ (re-se-dā'se-ē), a small natural order of plants, consisting of annual or perennial herbs, more rarely shrubs, with alternate or pinnately divided leaves, and small, irregular, greenish-yellow or whitish flowers. It inhabits Europe and all the basin of the Mediterranean. With the exception of *Resēda odorāta* (mignonette) and *R. luteŏla* (wild woad), most of the species are mere weeds.

Reservation (res-er-vā'shun). This term is used in the United States to designate a tract of the public land set aside for some special

use. In some of the States considerable tracts have been thus donated for the support of public schools. Much larger tracts have been set aside for the use of Indian tribes, which have been removed to these locations, supported by the government and kept under supervision. The most notable of these reservations was the Indian Territory, now the State of Oklahoma but still largely inhabited by Indian tribes. Other large reservations have been set aside, especially in the West, and the system has given rise to many evil practices, in which the Indians have been oppressed and robbed by dishonest agents and others. These evils are gradually being eliminated.

Reserve (re-zerv'), in military matters, has several significations. In battle the reserve consists of those troops not in action, and destined to supply fresh forces as they are needed, to support those points which are shaken, and to be ready to act at decisive moments. The reserve of ammunition is the magazine of warlike stores placed close to the scene of action to allow of the supply actually in the field being speedily replenished. The term reserves is also applied to those forces which are liable to be called into the field on great emergencies, for the purposes of national defense; which have received a military training but follow the ordinary occupations of civil life, and do not form part of the standing army. Such reserves now form a part of all national troops organized on a great scale. Liability to serve in the reserves continues generally from about the age of twenty to forty-two. In Great Britain the reserves consist of the army reserve and the auxiliary forces, namely, the militia, the yeomanry, and the volunteers. In the United States the National Guards of the States constitute such a reserve. (See *Army*, *Militia*, *Naval Reserve*, etc.)

Reserve, in banking and insurance, that portion of capital which is set aside to meet liabilities, and which, in banking, is therefore not employed in discounts or temporary loans.

Reservoir (rez'ėr-vwår), an artificial basin in which a large quantity of water is stored. The construction of a reservoir often requires great engineering skill. In the selection of a site the great object should be to choose a position which will give the means for collecting a large supply of rainfall with as little recourse as possible to artificial structures or excavations. The embankments or dams may be constructed either of masonry or earthwork. Reservoirs in which the dams are built of earthwork must be provided with a waste-weir, to admit of the surplus water flowing over; in the reservoirs of which the dams are built of masonry there is no necessity for a waste-weir, as then the water may be allowed to overflow the wall, there being no fear of its endangering the works. The outlet at the bottom, by which the water to be used is drawn off from the reservoir, may consist either of a tunnel, culvert, or iron pipes provided with suitable sluices. A vast system of reservoirs, called 'tanks,' exists in India, constructed for purposes of irrigation. The reservoirs upon the irrigation canals of Spain are all of masonry; they are circular or polygonal in shape, and the interior face of the wall, which is constructed of large ashlars, is vertical. In various other countries the preference is given to earthen dams. In the Western United States a series of immense reservoirs are now in process of construction, in which the waters of mountain streams are held back by great stone dams built across their outlets. These are intended for irrigation purposes, for the reclamation of great areas of sterile lands. In these cases means are adopted for raising or lowering the surface of the water, the difference between the lowest and the highest level of the surface, multiplied by the area of the lake, giving the measure of its available storage. Distributing reservoirs for towns are generally built of masonry, but are sometimes of iron. They are placed high enough to command the highest part of the town, and are capacious enough to contain half a day's supply, their chief use being to store the surplus water during the night. Reinforced concrete is now frequently employed in the building of reservoir dams. Several catastrophes have occurred from the bursting of imperfectly formed reservoirs. The bursting of the reservoir at Johnstown, Pennsylvania, in 1889 was a notable instance of this kind, 2200 persons being drowned and $10,000,000 worth of property destroyed. The breaking of a concrete dam at Austin, Pennsylvania, in 1911, led to the death of hundreds of persons and the loss of thousands of dollars' worth of property. See *Johnstown*.

Reshid Pasha (re-shēd' på'shå), a Turkish statesman, born at Constantinople in 1800; died in 1858. He represented the Porte in the courts of France and Britain, was several times made grand vizier, supported the policy of Sir Stratford Canning, and

was the chief of the party of progress in Turkey.

Resht (resht), a town of Persia, capital of the province of Gilan, 150 miles northwest of Teheran, near the Caspian Sea. Resht is a well-built town, and is the center of the silk trade of Persia, and through its port Enzelli, 16 miles distant, carries on a considerable trade with Russia. Pop. 41,000.

Residuary Legatee (re-zid'ū-a-ri leg'a-tē), in law, the person to whom the surplus of the personal estate, after the discharge of all debts and particular legacies, is left by the testator's will.

Resina (rā-sē'na), a town of Italy, in the province and 6 miles southeast of Naples, on the Gulf of Naples. It is built over the ruins of Herculaneum, and is the usual starting-place for the ascent of Vesuvius. Pop. 19,766.

Resins (rez'inz), a class of vegetable substances insoluble in water, soluble in alcohol, and easily softened or melted by heat. Resins are either neutral or acid; they are transparent or translucent; they have generally a yellow-brown color; are sometimes elastic, but more generally friable and hard. They become electric when rubbed. Resins may be divided into three classes: — (1) Those which exude spontaneously from plants, or from incisions in the stems and branches. They are generally mixtures of gum-resins and volatile oils. The principal resins belonging to this class are benzoin, dragon's-blood, Peru balsam, storax, copaiba, copal, elemi, guaiacum, jalap, lac, myrrh, sandarach, and turpentine. (2) Resins extracted from plants by alcohols; they generally contain definite carbon compounds. The principal resins belonging to this class are gum ammoniacum, angelica-root, Indian hemp, cubebs, manna, and squill. (3) Fossil resins, occurring in coal or lignite beds, amber, asphalt, copaline, fossil caoutchouc, etc.

Resist (re-zist'), in calico-printing, a paste applied to calico goods to prevent color or mordant from fixing on the parts not intended to be colored. Resists may be used either mechanically or chemically.

Resistance (re-zist'ans), ELECTRICAL, the opposition which a conductor offers to the flow of electricity, the conductor being removed so far from neighboring conductors that their action will be very small, and maintained at the temperature of 0° C. The unit of resistance now in use is called an ohm (which see).

Resolution (rez-u-lū'shun), in music, the movement of a dissonance into the consonant harmony for which it creates in the ear an expectation. This is effected by raising or depressing the note a tone or a semitone, according to the rules of harmonical progression.

Resonance (rez'u-nans), in acoustics, a strengthening of sound. Resonance includes such strengthening of sound as occurs in sounding-boards and the bodies of musical instruments.

Resonator (rez-u-nā'tur), a device for analyzing compound sounds and for detecting a particular note by sympathetic vibrations. It was invented by Helmholtz, and in its simplest form consists of a hollow bulb or round tube, with one aperture to be applied to the ear, and an opposite aperture of a certain size which serves to admit the vibrations of one musical note to which it is adapted and to exclude all others. A set of these may be formed each of which corresponds to a note of the musical scale.— ELECTRICAL. A conductor having one open circuit, designed for detecting the electromagnetic radiation from a nearby circuit, which is manifested by a spark, as a result of sympathetic electrical vibrations.

Resorcin (re-zor'sin), a colorless crystalline compound prepared on the large scale by the action of sulphuric acid on benzine, and by the treatment of the resulting compound with caustic soda. It yields a fine purple-red coloring matter and several other dyes used in dyeing and calico-printing.

Respiration (res-pi-rā'shun), the act of respiring or breathing. Respiration is that great physiological function which is devoted to the purification of the blood by the removal, through the media of the breathing organs, of carbonic acid and other waste products, and at the same time to the revivifying of the blood by the introduction of the oxygen of atmospheric air. It is thus partly excretory and partly nutritive in its character. The other waste products, besides carbonic acid, which are given off in the process of animal respiration, are water, ammonia, and organic matters; but carbonic acid is by far the most important.

In man and the higher animals respiration is carried on by the breathing organs or lungs. The blood is conveyed to the breathing organs by special vessels, the right side of the heart in birds and mammals being exclusively employed in driving blood to the lungs for purifica-

tion. The blood is sent through the pulmonary or lung capillaries in a steady stream, and passes through these minute vessels at a rate sufficient to expose it to the action of the oxygen contained in the air-cells of the lung. The essential part of the function of respiration, namely, the exchange of carbonic acid gas for oxygen, thus takes place in the lung, where the dingy-hued venous blood becomes converted into the florid red arterial blood. Respiration includes the physical acts of inspiration and expiration, both involuntary acts, although they may be voluntarily modified. From fourteen to eighteen respiratory acts take place per minute, the average quantity of air inhaled by a healthy adult man being about 30 cubic inches, a slightly smaller quantity being exhaled. This definite volume of air which ebbs and flows is termed *tidal* air. The quantity (about 100 cubic inches) which may be taken in a deep inspiration, in addition to the tidal air, is termed *complemental* air. The quantity of air (75 to 100 cubic inches) remaining in the chest after an ordinary expiration has expelled the tidal air is named *supplemental* or reserve air, and this may be in greater part expelled by a deeper expiration; while a quantity of air always remains in the lungs after the deepest possible expiratory effort, and cannot be got rid of. This latter quantity is therefore appropriately named *residual* air. The difference in the mode of breathing between the two sexes is clearly perceptible. In man it is chiefly *abdominal* in its character; that is to say, the lower part of the chest and sternum, together with the abdominal muscles, participate before the upper portions of the chest in the respiratory movements; while in women the breathing movements are chiefly referable to the upper portions of the chest. In women, therefore, breathing is said to be *pectoral.*

Every volume of inspired air loses from 4½ to 5 per cent. of oxygen and gains rather less carbonic acid. The quantity of carbonic acid given off varies under different circumstances. More carbonic acid is excreted by males than by females of the same age, and by males between eight and forty than in old age or in infancy. An average healthy adult man will excrete more than 8 oz. of carbon in 24 hours. Hence the necessity for repeated currents of fresh air in meeting places and places of public entertainment, in halls and in churches, and for the proper ventilation of sleeping apartments. The breathing of an atmosphere vitiated by organic matter and carbonic acid results in imperfect oxygenation of the blood, is accompanied or followed by headaches, drowsiness, and lassitude, and is the source of many serious and even fatal disorders.

While in man and the more highly organized animals respiration is carried on by the lungs, in fishes it is effected by the gills. The essential feature of any breathing organ is a thin membrane, having the blood on one side and air, or water containing air, on the other; and the essential feature of respiration is an interchange of products between the blood and the atmosphere, oxygen passing from the atmosphere or water into the blood, and carbonic acid and other excretory substances from the blood into the atmosphere or water. In the protozoa no respiratory organs are specialized, but the protoplasm of which the bodies of these animals are composed has doubtless the power of excreting waste matters, as well as of absorbing nutritive material. Even in comparatively high organisms, where no specialized breathing organs are developed, the function of respiration may be carried on by the skin or general body surface — the integument being, as in the highest forms, intimately correlated in its functions to the breathing process. Thus in earthworms, lower crustacea, etc., the breathing appears to be solely subserved by the body-surfaces.

Respiration goes on in plants as well as in animals, the plant in the presence of light exhaling oxygen and inhaling carbonic acid, and thus reversing the action of the animal.

Respiration, ARTIFICIAL. See *Drowning.*

Respirator (res-pi-rā′tur), a mouth-covering, which gives warmth to the air inhaled, and is used by persons having delicate lungs. It is constructed of a series of layers of very fine silver or gilt wires placed closely together, which are heated by the exhalation of the warm breath, and in turn heat the cold air before it is inhaled. Other respirators, designed to exclude smoke, dust, and other noxious substances, are used by firemen, miners, cutlers, grinders, and the like. Recently a form of respirator has been adopted by divers in which a store of compressed air or oxygen is contained in the helmet for breathing purposes. A similar expedient has been adopted by firemen and those entering mines after an explosion to avoid the breathing of vitiated air or poisonous gases.

Respir′atory Sounds, in medicine, the

sounds made by the air when being inhaled or exhaled, as heard by the ear applied directly to the chest, or indirectly through the medium of the stethoscope. The respiratory sounds are of the highest importance in the diagnosis of diseases of the chest and bronchial tubes.

Respite (res'pit), the temporary suspension of the execution of a capital offender. See *Reprieve.*

Respondent (re-spon'dent), in law, the designation of the party requiring to answer in a suit, particularly in a chancery suit.

Respondentia (res-pon-den'shi-a), a loan on the security of a ship's cargo. It is made on the condition that if the goods are lost, the lender shall lose his money. A similar loan on the security of the ship itself is called *bottomry.*

Rest, in music, an interval of silence between two sounds, and the mark which denotes such interval. Each note has its corresponding rest. See *Music.*

Rest-harrow, a common European leguminous plant (*Onōnis spinōsa*), akin to the brooms. It is plentiful in stiff clay land in some parts, and derives its name from its long and strong matted roots arresting the progress of the harrow. The stems are annual, often woody or shrubby, and hairy; the leaves are generally simple, entire towards the base; the flowers, mostly solitary, large, and handsome, are of a brilliant rose color. Rest-harrow is also called *cammock.*

Restiaceæ (res-ti-ā'se-ē), a natural order of plants allied to the Cyperaceæ or sedges, and confined to the southern hemisphere, being found chiefly in South Africa and Australia. They are herbs or undershrubs, with matted roots which bind shifting soil, hard wiry stems, simple narrow leaves, the sheaths of which are usually split, and inconspicuous brown rush-like panicles of flowers. *Restio tectorum* is employed in South Africa for thatching, and the stems of other species are manufactured into baskets and brooms.

Restigouche (res'ti-gösh), a river which separates New Brunswick from the province of Quebec, flowing N. E. into the Bay of Chaleurs at Dalhousie. It is 200 miles long, is navigable for 16 miles to Campbelton, and forms a tidal estuary for 24 miles. It drains 4000 square miles, and its basin supplies great quantities of timber.

Restoration (res-tu-rā'shun), in English history, the re-establishment of Charles II on the throne, May 29, 1660. The restoration was held as a festival in the Church of England till 1859.

Restorationist (res-tur-ā'shun-ist), one who believes in a temporary future punishment, but in a final restoration of all to the favor and presence of God. The name is applied to all of whatever sect who hold this belief, including the Universalists and especially a particular sect of Universalists.

Resurrection (res-u-rek'shun), the rising again of the body from the dead to be reunited to the soul in a new life. It has formed a part of the belief of the Christian Church since its first formation, and has been embodied as an article in each of the creeds. There are traces to be found of such a belief among heathen nations from a very early period. There can be little doubt that the Jews of later times held the doctrine, though it would be difficult to point to any express indication of it in the Old Testament. It appears, however, to be alluded to in Isaiah, xxvi, 19, and is distinctly affirmed in Daniel, chap. xii, 1-3. That the belief in the resurrection was generally held among the Jews at the time of Christ is evident, particularly from the position occupied by the Sadducees, a sect having as its most characteristic feature the denial of the resurrection. Beyond doubt, however, it was the gospel that 'brought life and immortality to light.' At best the notions of a resurrection and future state current prior to the advent of Christ were dim and undefined. With regard to the information conveyed to us in the New Testament on the doctrine of the resurrection, we are taught that it will be *universal*, extending to the wicked as well as to the righteous, John, v, 28, 29; Rev., xx, 13; that there shall be identity, in some sense, between the body which died and the body which shall be raised, 2 Cor., v, 10; that, as regards the resurrection of the righteous, the body, though identical, shall be wonderfully altered, Phil., iii, 21; 1 Cor., xv; Luke, xx, 35, 36; and that, as regards the time of the resurrection, it shall be at the end of this present earthly state, and that it shall be connected with the coming of our Lord to judge the world, 1 Thess., iv, 16.

Connected with this subject is the resurrection of Christ himself from the dead, the cornerstone of the Christian system. The evidence in support of it is marked by the following characteristics: — (1) *The variety of circumstances* under which the risen Saviour appeared.

(2) *The circumstantiality* of the testimony given by the different witnesses. (3) *The simplicity and apparent truthfulness* with which the witnesses describe their impressions when the Saviour appeared to them. (4) That *the event borne witness to was completely unexpected by the witnesses.* Various attempts have been made to explain away the resurrection of Christ. There is the supposition (1) of fraud; that, according to the statement of the Jews, the disciples stole the body, and then published the story that their Lord was risen. (2) That Jesus had not really died on the cross; that his apparent death was only a swoon, from which he afterwards recovered. (3) That there had been no real resurrection, but that the disciples had been deceived by visionary appearances or hallucinations. (4) That the assertion of the resurrection was originally allegorical. With regard to the significance of the resurrection of Christ, it was (believers assert) the crowning evidence of the divine character of his mission, he himself had spoken of it as what should be the most convincing proof to the world that he really was what he professed himself to be; and in this light it was constantly appealed to by the apostles in addressing the world.

Resurrection, Congregation of the, a society of Roman Catholic priests founded at Rome in 1836.

Resuscitation. See *Drowning.*

Retainer (re-tān'ėr), in law, the act of a client by which he engages an attorney or counselor to manage a case. The effect of a retainer is to confer on the attorney all the powers exercised by the forms and usages of the court in which the suit is pending. It is *special* when given for the purpose of securing the counsel's services for a particular case; *general*, when for securing his services generally. The retainer is in all cases accompanied by a preliminary fee called a retaining fee.

Retaining Wall, a wall erected for the purpose of confining a body of water in a reservoir, or for resisting the thrust of the ground behind it. As a general rule the thickness of retaining walls is one-third their height; in reservoir and dock walls of masonry the thickness is about one-half their height.

Retardation (rē-tar-dā'shun), in physics, the diminution of the velocity of a body from the friction of the medium in which the body moves or from the attraction of gravity. The laws of retardation are the converse of those of acceleration.

Rete Mucosum (rē'tē mū-kō'sum), in anatomy, the deepest layer of the epidermis or scarf-skin, resting on the cutis vera or true skin. It is the seat of the color of the skin and in the negro contains black pigment.

Retention (re-ten'shun), in law, a lien; the right of withholding a debt or of retaining property until a debt due to the person claiming this right is duly paid.

Retention of Urine, in medicine, a condition in which the urine cannot be expelled from the bladder at all, or only with great difficulty; to be distinguished from suppression of urine, a condition in which the bladder is empty, the urine not having been secreted by the kidneys. It may be due to some mechanical obstruction, as a calculus, a clot of blood, or a tumor, or to paralysis, etc. If not relieved by means of the catheter or otherwise it may cause rupture of the bladder and death.

Retford (ret'ford), East, a municipal borough in Nottinghamshire, England, 32 miles E. N. E. of Nottingham, on the Idle, here crossed by a bridge connecting East Retford with West Retford. It has foundries, machine-shops, paper and corn mills, etc. Pop. 13,336.

Rethel (ret-el), a town of France, department of Ardennes, on the Aisne, 23 miles N. E. of Rheims, with manufactures of merinos and cashmeres. Pop. (1906) 5254.

Rethel (rā'tel), Alfred, a German historical painter, born at Aix-la-Chapelle in 1816; studied at Düsseldorf (under Schadow), Frankfort (under Veit and Schwind), and Rome. He died at Düsseldorf in 1859. His greatest works are four frescoes in the town-house of Aix-la-Chapelle representing incidents connected with the life of Charlemagne, other four there being executed from his designs after his death. These are among the finest modern works of the kind. German history and the Bible also furnished him with various subjects, and he painted in water-color a series of pictures illustrative of Hannibal's passage of the Alps.

Retiarius (rē-shi-ā'ri-us), in Roman antiquities, a gladiator who wore only a short tunic and carried a trident and net, with which he endeavored to entangle and despatch his adversary. who was armed with helmet, shield, and sword.

Reticulated Molding (re-tik′ū-lāted), in architecture, a member enriched with a raised fillet interlaced in various ways like network. It is seen chiefly in buildings in the Norman style.

Reticulated Work, a species of masonry very common among the ancients, in which the stones are square and laid lozenge-

Reticulated Work — Roman.

wise, resembling the meshes of a net, and producing quite an ornamental appearance. It is the *opus reticulatum* of the Romans.

Reticulum (re-tik′ū-lum), the honeycomb bag or second cavity of the complex stomach of ruminants.

Retina (ret′i-na), in anatomy, a membrane of the eye, formed by an expansion of the optic nerve, and so constituted as to receive and transmit to the nerve the impressions which result in vision. See *Eye.*

Retinite (ret′i-nīt), a fossil resin found in the lignite beds of Devonshire, Hanover, and elsewhere.

Retirement (re-tīr′ment), in the army and navy, is withdrawment from the service with the retention of all or a portion of the pay. In the British army and navy the retirement of officers may be voluntary, but all officers must retire at fixed ages, according to their rank, receiving corresponding retired pay. In the United States army and navy officers are retired after forty years' service, or at sixty-two years of age, as the case may be, or at any time for sickness or disablement, receiving 75 per cent. of their annual pay for life.

Retort (re-tort′), a vessel, generally of glass, used in chemistry for distilling liquids. Retorts consist of flask-shaped vessels to which long necks or beaks are attached. The liquid to be distilled is placed in the flask and heat applied. The products of distillation condense in the cold neck of the retort, and are collected in a suitable receiver. In gasmaking, retorts of iron or fire-clay are used for distilling the coal.

Retreat (re-trēt′), a military operation, in which an army retires before an enemy; properly, an orderly march, in which circumstance it differs from a flight. Also a military signal given in the army by beat of drum or sound of trumpet at sunset, or for retiring from exercise or from action.

Retriever Dog (re-trēv′er), a dog specially trained to seek and fetch game which has been shot, and greatly valued by sportsmen for its sagacity in the field and in the water. The larger and more familiar breed of retrievers is formed by crossing the Newfoundland and setter; the smaller breed is formed by crossing the water-spaniel and terrier. The typical retriever is 20 or more inches high, with a stoutly-built body, strong limbs, webbed toes, and black and curly fur.

Retrograde (ret′rō-grād), a term given to the apparent motion of a planet among the stars when it is in opposition to the motion of the sun in the ecliptic. The motion of a planet in the direction from right to left is said to be *direct.*

Retrogression of the Moon's Nodes (ret′rō-gresh-un), the motion of the moon's nodes — the two points in which the moon's orbit meets the plane of the ecliptic — in the direction opposite to that of the sun's motion in the ecliptic. The moon's nodes slowly change at each revolution of the moon, in the direction from left to right, and make a complete revolution round the earth in 18.6 years.

Return (re-turn′), in law, the sending back of a writ or other process to the court from which it issued by the officer to whom it was addressed, with a written account of what he has done in executing the process, to be filed for reference in the office of the clerk of the court.

Returning Officer, the presiding officer who conducts an election and who returns the persons duly elected. He is styled the judge of election, he and the inspectors signing the certificate of election.

Retz, Gilles de. See *Rais.*

Retz (rā), Jean François Paul de Gondi, Cardinal de, was born at Montmirail in 1614; died at Paris, 1679. Contrary to his own inclinations, he was designed by his father, who was general of the galleys, for the church. His instructor was the celebrated Vincent de Paul. As a young abbé he led a very improper life, but his brilliant gifts, his eloquence, his audacity, and his great connections nevertheless enabled him to advance in his ecclesiastical career. In 1643 he received a doctorate at the Sorbonne, and was appointed coadjutor of his uncle, the Archbishop of Paris. He was the implacable enemy of Mazarin, and in 1648 became the most energetic and unscrupulous of the leaders of the Fronde. On the fall of Mazarin he was selected as minister by the queen-regent, Anne of Austria, and in 1651 received the cardinal's hat; but on Mazarin's return to power in 1652 he was arrested and imprisoned, first at Vincennes, then at Nantes. He escaped, however, after two years' captivity, and for nearly eight years wandered through Spain, Italy, Holland, Germany, and England. After the death of Mazarin in 1661 he was allowed to return to France, on condition that he should resign his claims to the archbishopric of Paris, receiving instead the rich abbey of St. Denis. During the last seventeen years of his life he lived retired, paid his immense debts, and occupied himself with the composition of his *Mémoires*, which are inimitable for their historic truth and narrative skill.

Retzsch (rech), Moritz, a German artist, was born at Dresden in 1779; died there in 1857. He studied at the art academy of his native city, of which he was appointed a professor in 1824. His most celebrated works are his outline illustrations of Shakespere, Goethe, Schiller, Fouqué, and others.

Reuchlin (roi*h*′lĭn), Johann, a German scholar, born in 1455 at Pforzheim; died in 1622. He studied at Freiburg, the University of Paris, Bâle, and elsewhere, and became familiar with Latin, Greek, and Hebrew. He was patronized by several of the German princes, and was engaged on various political missions. From 1502 to 1513 he was president of the Swabian federal court. His opposition to the proposal to burn all Hebrew books except the Bible raised a host of fanatical enemies against him, but did him no harm. In 1519 he was appointed professor at Ingolstadt; in 1521 the plague drove him to Stuttgart. During a great part of his life Reuchlin was the real center of all Greek and Hebrew teaching in Germany. Several of his works had considerable popularity in their time. He sympathized deeply with Luther in the earlier stage, but maintained his connection with the Roman Catholic Church to the last.

Reumont (roi′mont), Alfred von, a German historian, born at Aix-la-Chapelle, in 1808, was educated at Bonn and Heidelberg, and entered the Prussian diplomatic service, filling posts at Florence, Constantinople, and Rome. From 1851 till 1860, when he retired into private life, he was successively Prussian minister at Florence. Modena, and Parma. He died in 1887. He was the author of several valuable works on the history of Italy, including *Contributions to Italian History*, *The Carafas of Maddaloni*, *History of the City of Rome*, etc. He also wrote on the history of art.

Réunion (rā-ū-ni-ōn), formerly Bourbon, an island in the Indian Ocean, between Mauritius and Madagascar, 115 miles from each; area, 1127 square miles. It was annexed by France in 1643, and is an important French colony, now sending a representative to the chamber of deputies, and forming practically almost a department of France. It is very mountainous, the Piton des Neiges reaching a height of 10,069 feet, and the Piton de la Fournaise, an active volcano, of 8294 feet. The soil produces tropical products, sugar being the principal crop. Coffee, cloves, and vanilla are also grown. Destructive hurricanes are frequent. There are no natural harbors, but an artificial harbor has been constructed at Pointe des Galets, at the northwest side of the island; and this harbor is connected by railway with St. Denis (the capital), and all the principal places on the coast. The population, which consists of creoles, negroes, Indian coolies, Chinese, Malays, etc., is 173,315.

Reus (rā′ös), a city of Spain, in Catalonia, in the province and 10 miles west of Tarragona, in a plain at the base of a chain of hills, about 4 miles from the port of Salou on the Mediterranean. Reus is now, next to Barcelona, the most flourishing manufacturing town of Catalonia, the staples being silk and cotton. Imitation French wines are largely made. Pop. 26,681.

Reuss (rois), two principalities of Central Germany, consisting of several separate territories situated between Prussia, Saxony, and Bavaria, and belonging to an older and younger line of the family of Reuss. Reuss-Greiz, the territory of the elder line, comprises an area of 122 square miles, with a pop. of 70,603; the territory of the younger line,

Reuss-Schleiz-Gera, has an area of 319 square miles, with a pop. of 144,584. Both principalities have been members of the German Empire since 1871, each sending one member to the federal council and one representative to the Reichstag.

Reuter (roi'tėr), FRITZ, a German humorist, was born in 1810, and educated at Rostock and Jena. He became an active member of the student society 'Germania,' which cost him seven years' imprisonment in Prussian fortresses. Returning home in 1840 he supported himself first by farming, then by teaching, and finally by literary work. His first literary venture was a volume of humorous poems in Low German (*Laüschen and Riemels*, 1853), which met with extraordinary success. His greatest work is *Olle Kamellen*, a series of prose tales, which stamped him as the greatest writer of Plattdeutsch and one of the greatest humorists of the century. He died at Eisenach in 1874.

Reuter (roi'tėr), PAUL JULIUS, BARON, born at Cassel in 1821, was connected with the electric telegraph system from the beginning, and in 1849 established Reuter's News Agency at Aix-la-Chapelle. In 1851, on the laying of the cable between Calais and Dover, he transferred his chief office to London, and became a naturalized Englishman. As the telegraphic system extended he increased his staff of agents, until the newspaper press, the foreign bourses, and all banking, shipping, and trading companies became dependent in a great measure on Reuter's Agency for the latest information from all parts of the world. In 1865 he converted his agency into a limited liability company, of which he was managing director until 1878. In 1871 he received the title of baron from the Duke of Coburg-Gotha. He has laid down several important telegraphic cables. Died Feb. 25, 1899.

Reutlingen (roit'ling-ėn), a town of Würtemberg, 20 miles south of Stuttgart; has manufactures of cottons, woolens, lace, leather, etc. It is of considerable antiquity, and long maintained the rank of a free imperial city. It was incorporated with Würtemberg in 1802. Pop. 23,850.

Reval, or REVEL (re-vel'), a fortified seaport of Russia, capital of Esthonia, on a small bay in the Gulf of Finland. It consists of two parts, the old or upper town, surrounded by walls and situated on a rocky height, and the lower town on the beach. Reval was an important seaport of the Hanseatic League, and came into the possession of Russia in 1710. It contains several ancient churches, a fine modern church with spire 429 feet high, a cathedral, and many interesting antiquities. Its manufactures are unimportant, but its trade is large, the exports being chiefly grain, flax, and spirits, and the imports, coal, iron, cotton, tea, wine, and chemicals. It is much frequented for sea-bathing. Pop. 64,578.

Reveillé (re-vel'yā, from French, *reveiller*, to awaken), the signal given in garrisons at break of day, by beat of drum or sound of bugle, for the soldiers to rise and the sentinels to forbear challenging until the retreat is sounded in the evening.

Revelation (rev-e-lā'shun), the knowledge of God and his relation to the world, claimed to be given to men by God himself, and for the Christian contained in the Bible. The earliest revelations, made in the patriarchal age, were preserved till later times, and gradually enlarged during the Mosaic period by successive revelations to chosen individuals, with whom the Bible makes us acquainted under the name of prophets, from Moses to Malachi, the revelations finally completed being through Christ. See *Christianity*.

Revelation, BOOK OF. See *Apocalypse*.

Revelganj (rev-el-ganj'), or GODNA, a commercial town of India, in Bengal, near the junction of the Ganges and Ghagra. It has an important local trade. Pop. about 15,000.

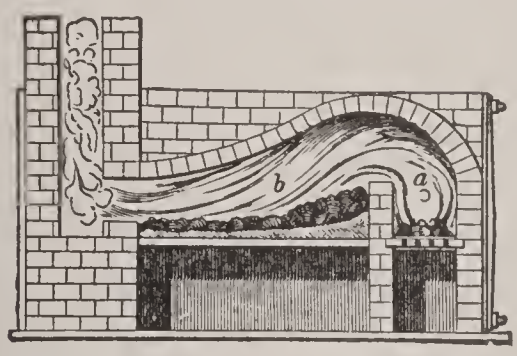
Revels (rev'elz), MASTER OF THE, an officer formerly appointed in England to superintend the revels or amusements, consisting of dancing, masking, etc., in the courts of princes, the inns of court, and noblemen's houses, during the twelve Christmas holidays. He was a court official from the time of Henry VIII to that of George III.

Revenue (rev'e-nū), the income of a nation derived from taxes, duties, and other sources, for public uses. See articles on the different countries, also *Tax*, etc.

Revenue Cutter, a sharp-built single-masted vessel, armed for the purpose of preventing smuggling and enforcing the custom-house regulations.

Reverberatory Furnace (re-ver'ber-a-tu-ri), a furnace in which the material is heated without coming into contact with the fuel. Between the fireplace *a* and the bed on which the material to be heated *b* lies, a low partition wall, called a fire-bridge, is placed. The flame passes over this bridge, and

plays along the flat arch which surmounts the whole, reflecting or reverberating the heat downwards. The reverberatory furnace gives free access of air to the material, and is employed for oxidizing impurities in metals, and for other similar purposes.



Section of Reverberatory Furnace.

Revere (re-vēr′), PAUL, was born at Boston, Massachusetts, Jan. 1, 1735, was one of the earliest American engravers and an active patriot in the Revolution. He was one of those who destroyed the tea in Boston harbor, and he earned fame by riding from Charlestown towards Concord on the night of April 18, 1775, to give warning of the British expedition, which was resisted next day at Lexington and Concord; a service immortalized in Longfellow's poem, *The Midnight Ride of Paul Revere.* During the war he rose to be lieutenant-colonel of artillery. In 1801 he erected works for rolling copper at Canton, Massachusetts, still carried on by his successors. He died May 10, 1818.

Revere, a village of Suffolk Co., Massachusetts, 4 miles N. E. of Boston, on Massachusetts Bay, is a favorite place of resort. Pop. 18,219.

Reverend (rev′er-end), a title of respect given to clergymen and other ecclesiastics. In England bishops are *right reverend*, archbishops *most reverend*, deans *very reverend*, and the lower clergy *reverend.* In Scotland the principals of the universities, if clergymen, are *very reverend*, and likewise the moderator of the General Assembly; all the other clergy *reverend*, as also in the United States.

Reverse (re-vers′), in numismatics, the side of a medal or coin opposite to that on which the head or principal figure is impressed. The latter is called the *obverse.*

Reversion (re-ver′shun), in law, the residue of an estate left in the granter, to commence in possession after the determination of the particular estate granted by him. The estate returns to the granter or his heirs after the grant is over. In insurance business a reversion is an annuity or other benefit, the enjoyment of which begins after a certain number of years, or after some specified event, as a death or birth.

Revetment (re-vet′ment; French, *revêtement*), in fortification, is a retaining wall placed against the sides of a rampart or ditch. In field-works it may be of turf, timber, hurdles, and the like; but in permanent works it is usually of stone or brick. The exterior faces of these walls are considered as the scarp and counterscarp of the ditch.

Review (re-vū), an inspection of military or naval forces by an officer of high rank or by a distinguished personage, which may be accompanied with maneuvers and evolutions.

Reviews. See *Periodicals.*

Revise (re-vīz′), among printers, a second or third proof of a sheet to be printed, taken off in order to be compared with the last proof, to see that all the mistakes marked in it have been corrected. See *Proof Impression.*

Revising Barrister, in England, one of a number of barristers appointed annually for the purpose of examining or revising the list of parliamentary voters, and settling the question of their qualification to vote — duties performed in Scotland by the sheriff-substitute. The revising barristers' courts are held in the autumn.

Revival (re-vī′val), a term applied to religious awakenings in the Christian church, and to the occurrence of extensive spiritual quickening and conversion in the general community. The first great revival in Europe was the Reformation in the sixteenth century, which awoke the church from the sleep of centuries. When religion had degenerated into formalism in England in the seventeenth century a second revival of spiritual interest was accomplished through the instrumentality of the Puritans. When the church had once more sunk into a state of sloth and apathy in the eighteenth century, it was aroused by the preaching of Whitfield, the Wesleys, Rowland Hill, and other earnest men. Coincident with this movement was the origin of missions to the heathen. But it was reserved for recent times to witness in the United States and Great Britain perhaps the most remarkable religious revival which has been witnessed since the era of the Reformation. Movements of this nature, but of limited extent, have not been infrequent in the American churches, as in 1736 and 1830; but the great revival which originated in

the United States in 1858 subsequently extended to the British Islands, and was experienced with more or less power throughout almost every part of the world. New York and Philadelphia were the principal centers of the movement, which became universal in the United States, embracing all denominations and all classes of society. In the summer of 1859 the revival extended to the north of Ireland, chiefly through the agency of the Presbyterian Church, and from there to Scotland, Wales and various parts of England. A later revival movement was that initiated by the two American 'evangelists,' D. L. Moody and Ira D. Sankey, the latter a singer, whose hymns aided Moody's sermons in arousing religious feeling. The movement commenced in 1873 in England, but it attained no great prominence until the arrival of the two evangelists in Edinburgh. Their ministrations in that city, and afterwards in Glasgow, Dundee, and other towns in Scotland, and also in England and Ireland, up to August, 1875, were attended daily by multitudes of people, a remarkable feature of these assemblies being the presence in great numbers of the upper ranks of society, even to members of the peerage and royal family. On their return to the United States they headed a similar movement there; and they paid a second and equally successful visit to Britain in 1883-84. The Salvation Army, which was originated in 1865 and organized under its present name in 1878, may be regarded as a permanent revival organization. See *Salvation Army.*

Revival of Learning. See *Renaissance.*

Revocation (rev-u-kā'shun), in law, the destroying or annulling of a deed or will which had existence till the act of revocation made it void. The revocation of a deed can only be affected when an express stipulation has been made in the deed itself reserving this power. The revocation of a will can be made in four different ways — (1) by another will; (2) by intentional burning, or the like; (3) by the disposition of the property by the testator in his lifetime; (4) by marriage.

Revolution (rev-u-lū'shun), the more or less sudden, and it may be violent, overturning of a government or political system, with the substitution of something else. The term 'revolution' is applied distinctively in English history to the convulsion by which James II was driven from the throne in 1688; in American history to the war of independence of 1775-83; and in French history to the upheaval of 1789. Subsequent French revolutions were those of 1830, 1848, and 1871.

Revolver (re-vol'vėr), a variety of firearm in which a number of charges contained in a revolving cylinder are, by pulling the trigger, brought successively into position and fired through a single barrel. For the introduction of the revolver in its present form we are indebted to Colonel Samuel Colt, of the United States, though repeating pistols had long been known in other countries. These were made from one mass of metal bored into the requisite number of barrels, but were so clumsy as to be almost useless. In Colt's weapon there is a revolving cylinder containing six chambers placed at the base of the barrel, each chamber having at its rear end a nipple for a cap. These contain the cartridges, which are put in from the front of the breech-piece and driven home by a lever ramrod placed in a socket beneath the barrel. The revolver is fired through the single barrel, the cylinder being turned by mechanism connected with the lock, until each chamber in succession is brought round so as to form virtually a continuation of the barrel. Various modifications of Colt's revolver have been introduced, with the view in some cases of increasing the rapidity and facility of firing, in others of diminishing by safeguards the risks to which inexperienced hands must ever be exposed in the use of these weapons. In the Smith and Wesson revolver, one of the most recent (adopted by Austria and Russia), facility in loading is a feature, the cylinder and barrel together being pivoted to the front of the stock, so that by setting the hammer at half-cock, raising a spring-catch, and lowering the muzzle, the bottom of the cylinder is turned up to receive fresh metallic cartridges. When this is done the muzzle is pressed back until the snap-catch fastens it to the back plate, and the revolver is again ready to be fired. In the latest form of this revolver the spent cartridges are thrown out of the cylinder by means of an automatic discharger. Several other forms of the revolver are in use, their principal features being means to facilitate loading and firing. As a military weapon the revolver will, it is thought, be superseded by a repeating pistol with mechanism similar to that of magazine rifles. The revolver principle has also been applied to rifles, and to guns for throwing small projectiles, as in the Gatling and other machine guns.

Revolving Furnace, a furnace with a rotary motion, used in some chemical manufactures of malleable iron. The revolving furnace has superseded the reverberatory furnace in many processes.

Revolving Light. See *Lighthouse.*

Rewá (rā′wä), a native state in Central India, more or less under British control since 1812. Area, about 10,000 square miles; pop. (chiefly Hindus) about 2,000,000. The state is rich in minerals and forest produce.— The town of Rewá lies 75 miles s. w. of Allahabad; it is surrounded by three ramparts, the innermost of which encloses the palace of the maharaja. Pop. about 25,000.

Rewá Kántha (kän′tu), a political agency of India, subordinate to the government of Bombay. It was established in 1821-26, and has under its control 61 separate states, great and small, on the Nerbudda, most of which are tributary to the Gaekwar of Baroda. Area, 4792 square miles; pop. 479,065.

Rewári (rē-wä-rē′), a town in India, in Gurgaon district, Punjab, a place of considerable commercial importance, with manufactures of brass and pewter vessels and fine turbans, and a great trade in grain. Pop. 27,295.

Reyjkavik (rik′yä-vēk), a town, capital of Iceland. Pop. 8000.

Reynard the Fox. See *Renard.*

Reynolds (ren′oldz), John Fulton, a soldier, was born at Lancaster, Pennsylvania, in 1820, was graduated from West Point in 1841, served in the Mexican war, and in 1859 became commandant at West Point. He entered the Civil war in 1861 as lieutenant colonel of volunteers, was soon promoted brigadier general, and major-general in 1862, succeeding Hooker in command of the first army corps. He commanded in the first day's fight at Gettysburg, July 1, 1863, and was killed on the field.

Reynolds, Sir Joshua, an English portrait-painter, was born at Plympton, Devonshire, July 16, 1723, and was educated by his father, a clergyman and the master of the free grammar school of that place. He studied his art for two years under Thomas Hudson, a Devonshire man then popular in London as a portrait-painter. Subsequently, through the kindness of Captain (afterwards Admiral) Keppel, he was enabled to visit Italy, where he studied three years. Returning to London in 1753, and finding generous patrons in Admiral Keppel and Lord Edgcumbe, his studio was thronged with the wealth and fashion of the metropolis, and the most famous men and the fairest women of the time were among his sitters, so that he rapidly acquired opulence, and was the acknowledged head of his profession. Among the more notable of his portraits are the *Duchess of Hamilton* (1758), the *Duke of Cumberland* (1759). *Miss Palmer* (1770), *Mrs. Nesbitt as Circe* (1781), *Mrs. Siddons as the Tragic Muse* (1784), the *Duchess of Devonshire and Child* (1786), and *Miss Gwatkin as Simplicity* (1788). In 1768, on the foundation of the Royal Academy, he was chosen president, and received the honor of knighthood; and in 1784 he was appointed principal portrait-painter to the king. As president of the Royal Academy he delivered his celebrated annual *Discourses on Painting*, the last of which was delivered in 1790. He was the intimate friend of Dr. Johnson, Goldsmith, Garrick, Burke, and other literary celebrities, with whom he was associated in founding the 'Literary Club' in 1764. His portraits are distinguished by dignity and grace, and above all by a peculiar power of color which he had caught in Italy from the great Venetian masters. Apart from portraiture the other pictures which may be mentioned are his *Death of Cardinal Beaufort*, *Macbeth*, *Puck*, and several *Holy Families* and *Nativities*. He died unmarried Feb. 23, 1792, and was interred in St. Paul's Cathedral.

Sir Joshua Reynolds.

Rhabdomancy (rab′du-man-si; Greek *rhabdos*, a rod, and *manteia*, divination), divination by means of the divining-rod (which see).

Rhadamanthus (rad-a-man'thus), in Greek mythology, a son of Zeus and Europa, and brother of Minos, king of Crete, whom he assisted in his sovereignty, and whose jealousy he aroused by his inflexible integrity, which earned for him the admiration of the Cretans. Rhadamanthus then fled to Bœotia, where he married Alcmene. After his death he became, on account of his supreme justice, one of the three judges of the lower world.

Rhætia (rē'she-a), a province of the Roman Empire, which included great part of the Alpine regions between the valleys of the Danube and the Po, and corresponded with the districts occupied in modern times by the Austrian province of Tyrol and the Swiss canton of Grisons. The Rhætians, who are generally supposed to have been of Etruscan origin, were subdued by Drusus and Tiberius, 15 B.C., and shortly afterwards Rhætia was incorporated as a province in the Roman Empire. During the last days of the Roman Empire, when the barbarians devastated the provinces, Rhætia was nearly depopulated; and after the fall of the Roman Empire it was occupied by the Alemanni and Suevi.

Rhætian Alps. See *Alps*.

Rhætic Beds (rē'tik), in geology, the uppermost strata of the triassic, or, according to others, the lowest of the liassic group; well represented in England and Germany, but most extensively developed in the Rhætian Alps, whence their name. They are more highly fossiliferous than any of the other members of the triassic period.

Rhamazan. See *Ramadan*.

Rhamnaceæ (ram-nā'se-ē), a natural order of exogenous plants, consisting of trees or shrubs, with simple, alternate, rarely opposite leaves, small greenish-yellow flowers, a valvate calyx, hooded petals, opposite to which their stamens are inserted, and a fruit which is either dry or fleshy. This order contains about 250 known species, distributed very generally over the globe. There is a remarkable agreement throughout the order between the properties of the inner bark and the fruit, especially in several species of *Rhamnus*, in which they are both purgative and emetic, and in some degree astringent. Many species, however, bear wholesome fruit; and the berries of most of them are used for dyes. (See *French Berries*.) The buckthorn and jujube belong to this order.

Rhapsodists (rap'su-dist; from the Greek *rhaptō*, to string together, and *ōdē*, a song), were the wandering minstrels among the ancient Greeks, who sang poems of Homer (these were also called *Homeridæ*) and of other poets. After the poems were committed to writing the rhapsodists lost their importance.

Rhé. See *Ré*.

Rhea (rē'a), in Greek mythology, the daughter of Uranos and Gē (Heaven and Earth), sister and wife of Cronos (Saturn), and mother of Hestia (Vesta), Dēmētēr (Ceres), Hera (Juno), Hades (Pluto), Poseidon (Neptune), and Zeus (Jupiter). She was the symbol of the reproductive power of nature and received the appellation of 'Mother of the Gods,' and 'Great Mother,' being later identified with Cybele.

Rhea, same as *Ramie* or *Ramee* (which see).

Rhea, the generic name of the nandu, or South American ostrich, a close ally to the true ostrich, differing chiefly in having three-toed feet and each toe armed with a claw. The best-known species is *R. Americana*, the *nandu*, or *nanduguaçu* of the Brazilians, inhabiting the great South American pampas. It is considerably smaller than the true ostrich, and its plumage is much inferior. *R. Darwinii*, a native of Patagonia, is still smaller. A third species is the *R. macrorhyncha*, so-called from its long bill.

Rhegium. See *Reggio*.

Rheims, or REIMS (rēmz; French pron. raṇz), a town of France, in the department of Marne, in an extensive basin surrounded by vine-clad hills, 82 miles E. N. E. of Paris. The principal edifices are the cathedral, erected in the thirteenth and fourteenth centuries, one of the finest Gothic structures now existing in Europe, specially remarkable for its western façade with three portals, rose-window, and numerous statues; the archiepiscopal palace (1498–1509), occupied by the French kings on the occasion of their coronation; the church of St. Remy (eleventh and twelfth centuries), the oldest church in Rheims, partly Romanesque, partly Gothic; the Porte de Mars, a Roman triumphal arch erected in honor of Julius Cæsar and Augustus; the town-house, of the seventeenth century; and several ancient mansions, particularly the hôtel of the counts of Champagne, furnishing fine specimens of picturesque street architecture. The staple industries are the manufacture of the wine known as champagne, and of woolen fabrics, such as flannels, merinos, blankets, etc. Rheims was an

important place in the time of Cæsar, the capital of the Remi, and subsequently of Belgic Gaul. Here St. Remy converted and baptized Clovis and almost all the Frankish chiefs in 496. It was made the seat of an archbishop in the eighth century, and from the time of Philip Augustus (1179) to that of Charles X the kings of France were crowned here. It has suffered much from war, and was at one time in possession of the English, who were expelled by the Maid of Orleans in 1429. It was held by the Germans in 1870-71. Since the Franco-German war it has been surrounded with detached forts, strengthening it greatly. Pop. 108,385.

Rheingau (rīn'gou), a picturesque district of Wiesbaden, on the right bank of the Rhine, between Biebrich and Rüdesheim, about 12 miles long by 5 broad, noted for its wines.

Rhenish Prussia (ren'ish prush'a; German, *Rheinprovinz*), the most westerly province of Prussia, touching W. and N. Luxemburg, Belgium, and Holland; area, 10,420 square miles; greatest length from N. to S. about 200 miles, greatest breadth about 90. In the south it is hilly, being traversed by the ranges of the Eiffel, Hochwald, etc. It is watered by the Rhine, the Moselle, and some affluents of the Meuse. A large proportion of the surface is in forest. Besides the usual cereal crops, tobacco, hops, flax, rape, hemp, and beet-root are raised; fruit culture and the vine culture are also carefully attended to. Cattle are extensively reared. It is the most important mineral district in Germany, abounding in coal, iron, lead, zinc, etc. It is likewise an active manufacturing district, there being numerous ironworks and machine-shops, textile factories, breweries, distilleries, etc. It is divided into the five governments or districts of Coblentz, Treves, Cologne, Aachen (Aix-la-Chapelle), and Düsseldorf. The city of Coblentz is the official capital of the province, but Cologne is the town of most importance. Pop. 5,759,798, the majority of whom are Roman Catholics.

Rhenish Wines, the general designation for the wines produced in the region watered by the Rhine, and specifically for those of the Rheingau, the white wines of which are the finest in the world. The red wines are not so much esteemed, being considered inferior to those of Bordeaux. Good wines are also produced in the valleys of the Neckar, Moselle, and other tributaries of the Rhine. The vineyards are mainly between Mannheim and Bonn, and the most valuable brands of wines are those of Johannisberg, Steinberg, Hochheim, Rüdesheim, Rauenthal, Markobrunn, and Assmannshausen, the last being a red wine.

Rheostat (rē'u-stat), an instrument for measuring electrical resistances, invented by Sir Charles Wheatstone. The rheostat is very convenient for measuring small resistances; but for practical purposes, such as measuring the resistance of telegraph cables, Wheatstone's bridge (an apparatus of which there are several forms) is always used.

Rhesus Monkey (rē'sus), a name for two species of monkeys, the brush or pig-tailed monkey (*Macācus nemestrīnus*), which inhabits the Malay Peninsula and the islands of the Indian Archipelago, and is often domesticated; and the *Macacus Rhesus*, a species of monkey held sacred in India, where they swarm in large numbers about the temples.

Rhetoric (ret'o-rik), in its widest sense, may be regarded as the theory of eloquence, whether spoken or written, and treats of the general rules of prose style, in view of the end to be served by the composition. In a narrower sense rhetoric is the art of persuasive speaking, or the art of the orator, which teaches the composition and delivery of discourses intended to move the feelings or sway the will of others. In the wider sense rhetoric treats of prose composition in general, purity of style, structure of sentences, figures of speech, etc.; in short, of whatever relates to clearness, preciseness, elegance, and strength of expression. In the narrower sense it treats of the invention and disposition of the matter, the character of the style, the delivery or pronunciation, etc. Aristotle, Cicero, and Quintilian are the principal writers on rhetoric among the ancients. Those of modern times are numerous.

Rheumatism (rö'mȧ-tizm) is a systemic disease that affects the muscles, joints, and heart. It occurs in acute, chronic, and muscular forms. The acute form is characterized by heat, inflammation, serous effusion, and excruciating pain in the joints, increased by movement; fever, profuse acid sweats, great thirst, constipation, redness of the skin over the joints, and a condition of the skin akin to prickly heat. It suddenly ceases in some joints and immediately begins in others. It lasts from two to six weeks or even longer. The chronic form is marked by pain and stiffness in the joints or muscles, aggravated by stormy weather. It may become acute on slight provocation. Unless

thoroughly eradicated it may seriously impair the joints. The muscular form may affect almost any of the muscles. That of the muscles of the back, lumbago, is a well-known and frequent condition. Rheumatism is caused by chilling of the body by a cold and moist atmosphere, especially when following in succession to a warm one, such as occurs in spring or autumn, though it may occur at any season of the year. Acute cases or those of long duration may have involvement of the heart as a consequence. A large percentage of heart diseases are caused by rheumatism, which ought never to be neglected. There seems to be a relation among rheumatism, St. Vitus' dance and tonsilitis. It is treated by rest in bed, heat, use of woolen bedclothes and clothing (to avoid chilling by linen and cotton), alkaline drinks and appropriate medication adapted to the particular case. Advertised rheumatic remedies are dangerous, as each case must be treated on its merits. After the subsidence of the acute condition, massage and passive and active movements, judiciously attempted, accelerate recovery.

Rheydt (rīt), a town of Rhenish Prussia, on the Niers, 14 miles W. of Düsseldorf, has manufactures of cotton, silk, woolen, and mixed fabrics. Rheydt is an ancient place, which has risen to industrial importance during the last century. Pop. (1905) 40,149.

Rhigas (rē'gas), CONSTANTINE, a Greek poet, the Tyrtæus of modern Greece, the first mover of the war for Grecian independence, was born about 1753. He formed the bold plan of freeing Greece from the Porte by means of a great secret association, and composed in his native language a number of patriotic songs, calculated to inflame the imagination of the Greek youth and to embitter them against the Mussulmans. He was arrested and put to death by the Turkish authorities at Belgrade in May, 1798. During the Greek war of independence, his songs were in the mouth of every one.

Rhin (rēn), BAS- and HAUT-, that is Lower and Upper Rhine, former departments of France, on the west of the Rhine, now forming part of the German territory of Alsace-Lorraine.

Rhinanthus (ri-nan'thus), a genus of annual herbs, natural order Scrophulariaceæ, with opposite, serrate leaves and nodding spikes of yellow flowers. The species are parasitic on the roots of plants. Two of them grow in pastures in the United States, and are known as *yellow rattle.*

Rhindlander, (rīn'lan-dėr), a city, capital of Oneida Co., Wisconsin, 65 miles N. E. of Wausau. Its industries include refrigerators, paper, beer, and lumber. Pop. 5637.

Rhine (rīn; German, *Rhein;* Dutch, *Rijn*), the largest river of Germany, and one of the most important rivers of Europe, its direct course being 460 miles and its indirect course 800 miles (about 250 miles of its course being in Switzerland, 450 in Germany, and 100 in Holland); while the area of its basin is 75,000 square miles. It is formed in the Swiss canton Grisons by two main streams called the Vorder and Hinter Rhein. The Vorder Rhein rises in the Lake of Toma, on the S. E. slope of the St. Gothard, at a height of 7690 feet above the sea, near the source of the Rhone, and at Reichenau unites with the Hinter Rhein, which issues from the Rheinwald Glacier, 7270 feet above sea-level. Beyond Reichenau, which is 7 miles west of Coire, the united streams take the common name of Rhine. From Coire the Rhine flows north through the Lake of Constance to the town of that name, between which and Bâle it flows west, forming the boundary between Switzerland and Germany. At Bâle it turns once more to the north and enters Germany; and, generally speaking, it pursues a northerly course until it enters Holland, below Emmerich, when it divides into a number of separate branches, forming a great delta, diked on both sides, and falling into the sea by many mouths, through sluice gates. The chief of these branches are the Waal and Lek, which unite with the Maas; the Yssel and Vecht, which diverge to the Zuyder Zee; and that which retains the name of Rhine, a small stream that passes Leyden and enters the North Sea. In the German part of its course the chief tributaries it receives on the left are the Ill, Nahe, Moselle (with the Saar), Ahr, and Erft; and on the right the Neckar, Main, Lahn, Sieg, Ruhr, and Lippe. In Switzerland its tributaries are short and unimportant, and this part of its course is marked by the Falls of the Rhine at Schaffhausen, where the river is precipitated in three leaps over a ledge of rocks 48 to 60 feet in height, and by the cataracts of Lauterberg and the rapids of Rheinfelden. The chief towns on its banks are Constance and Bâle in Switzerland; Spires, Mannheim, Mainz, Coblentz, Bonn, Cologne, and Düsseldorf, with Worms and Strasburg not far distant, in Germany; Arnheim, Utrecht, and Leyden, in Holland. Its breadth at Bâle

is 750 feet; between Strasburg and Spires from 1000 to 1200 feet; at Mainz 1500 to 1700 feet; and at Emmerich, where it enters the Netherlands, 2150 feet. Its depth varies from 5 to 28 feet, and at Düsseldorf amounts even to 50 feet. It abounds with fish, especially pike, carp, and other white fish, but the produce of its salmon fisheries have been seriously interfered with since the introduction of steam vessels. It is navigable without interruption from Bâle to its mouth, a distance of 550 miles, and much timber in rafts, coal, iron, and agricultural produce are conveyed by it. Large sums are spent every year in keeping the channel in order and in the erection or repair of river harbors, both in Germany and Holland. The shipping has greatly increased since the introduction of steam vessels, which also ply on the Main, the Neckar, the Maas, and the Moselle. The Rhine anciently formed the boundary between the Roman Empire and the Teutonic hordes. After the partition of the domains of Charlemagne in 843 it lay within the German Empire for nearly 800 years. France long cast covetous eyes upon the Rhine, and the Peace of Westphalia in 1648 gave her a footing upon the left bank. In 1801 the whole of the left bank of the Rhine was formally ceded to France. The Congress of Vienna in 1815 restored part of the Rhenish valley to Germany, and the cession by France of Alsace and Lorraine after the war of 1870–71 made the Rhine once more German. The Rhine is distinguished by the beauty of its scenery, which attracts many tourists. For a large part of its course it has hills on both sides at less or greater distances. Pleasant towns and villages lie nestled at the foot; above them rise rocky steeps and slopes clothed at one time with vines, at others with natural wood, and every now and then the castles and fastnesses of feudal times are seen frowning from precipices apparently inaccessible. The finest part for scenery is between Bingen and Bonn; after entering Holland the views are generally tame and uninteresting on account of the lack of elevation in the bordering country.

Rhine, Confederation of. See *Confederation of the Rhine.*

Rhine Province. See *Rhenish Prussia.*

Rhine Wine. See *Rhenish Wines.*

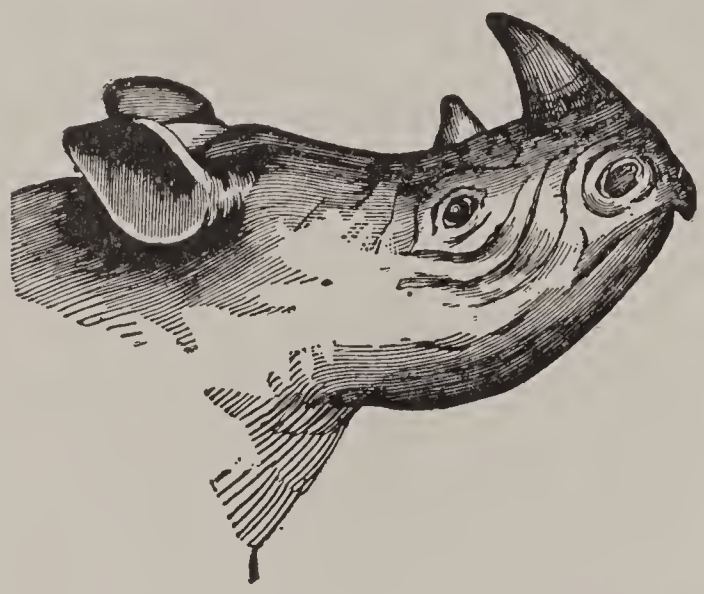
Rhinobatidæ (rī-no-bat'i-dē), the shark-rays or beaked rays, a family of fishes, of which the sawfish is the most remarkable member. See *Sawfish.*

Rhinoceros (rī-nos'er-os), a genus of hoofed mammals, belonging to the perissodactylate or odd-toed division, allied to the elephant, hippopotamus, tapir, etc. They are large, ungainly animals, having short legs, and a very thick skin, which is usually thrown into deep folds. There are seven molars on each side of each jaw; there are no canines, but there are usually incisor teeth in both jaws. The feet are furnished with three toes each, encased in hoofs. The nasal bones usually support one or two horns, which are of the nature of epidermic growths, somewhat analogous to hairs. These animals live in marshy places, and subsist chiefly on grasses and foliage. They are exclusively confined to the warmer parts of the eastern hemisphere. The most familiar species is the one-horned or Indian rhinoceros (*Rhinoceros unicornis* or *indicus*), which, like all the Asiatic species, has the skin thrown into very definite folds, corresponding to the regions of the

Indian Rhinoceros (*Rhinoceros indicus*).

body. The horn is black, and usually very thick. The upper lip is very large, and is employed by the animal somewhat as the elephant uses his trunk. Though possessed of great strength, it is quiet and inoffensive unless provoked. The Javanese rhinoceros (*R. sondaicus*) is distinguished from the Indian chiefly by its smaller size. It has been trained to bear a saddle and to be driven. It occurs in Java, Sumatra, and Borneo. The Sumatran species (*R. sumatrensis*) is found in Sumatra and the Malay Peninsula. It has two horns, the foremost being the longer and sharper. The typical African rhinoceros (*R. bicornis*), is found in Southern Africa generally. Like other African species, it possesses no skin-folds. The horns are of very characteristic conformation. the front horn being broad and raised as on a base, sharp-pointed, and curved slightly backwards, while the hinder horn is short and conical.

This animal is of ferocious disposition, is quick and active, and greatly feared by the natives. Other allied African species are the keitloa or Sloan's rhinoceros (*R. Keitloa*), the white rhinoceros (*R.* or *Ceratotherium Simus*), and the *Kobaoba* or long-horned, white rhinoceros (*R.* or *C. Oswclli*). Fossil species are numerous, and range from the Miocene tertiary through the Pliocene and Postpliocene deposits. *R. tichorhinus*, the 'woolly rhinoceros' formerly inhabited England and ranged over the greater part of Europe.



Two-horned Rhinoceros (*R. bicornis*).

Rhinoceros-bird, or RHINOCEROS-HORNBILL. See *Hornbills.*

Rhinolophidæ (rī-no-lof'i-dē), a family of insectivorous bats, including the greater and lesser horseshoe bats. See *Bat.*

Rhinoplastic Operation (rīn-u-plas'tik), the surgical operation of restoring the nose when partly lost by disease or injury (early practiced in India by the Brahmans), by means of a triangular piece of skin cut from the forehead, and drawn down to its new position while still attached to the face by the lower angle. A piece of skin belonging to the arm has been employed for the same purpose, and the extreme joint of a finger has been used to support such an artificial nose. It is popularly known as the *Taliacotian operation*, from the name of the Italian surgeon who in the sixteenth century first made it public.

Rhio, or RIOUW (ri-ou'), a seaport belonging to the Dutch, in the Indian Archipelago, on an islet 50 miles southeast of Singapore. It consists of a European town, and a Chinese or native town, and having a capacious haven where large vessels find anchorage, carries on a considerable trade. It is the capital of a Dutch residency, comprising the islands of the Rhio Archipelago and other groups as well as districts on the east coast of Sumatra. The population of the residency is estimated at 90,000. The Rhio Archipelago is a group of small islands lying chiefly south and east of Singapore. Chief island Bintang.

Rhizantheæ (rī-zan'the-ē), or RHIZ'OGENS, a remarkable group of plants, considered by Lindley as forming a separate class, which he places in a position intermediate between the Thallogens and the Endogens. It consists of plants destitute of true leaves, but with short, amorphous stems parasitical on roots, and is divided by Lindley into the three orders, Balanophoraceæ, Cytinaceæ, and Rafflesiaceæ. By other botanists these orders are placed widely apart.

Rhizobolaceæ (ri-zu-bu-lā'se-ē), the suwarro-nut order of plants, of which only a few species are known, consisting of large exogenous trees growing in the forests of South America. One of them (*Caryocar butyrōsum*), a gigantic tree of Demerara, yields the suwarro, or souari nut, the kernel of which is esteemed as the most agreeable of the nut kind. The timber is used in shipbuilding.

Rhizomania (rī-zu-mā'ni-a), in botany, an abnormal development of some plants, as the vine and laurel, by which they throw out adventitious roots, indicating that there is something wrong with the proper root.

Rhizome (rī'zom), or ROOT-STOCK, in botany, a sort of stem running along the surface of the ground, or partially subterranean, sending forth shoots at its upper end and decaying at the other. It occurs in the ferns, iris, etc.; and in the ferns it may be wholly covered with the soil.

Rhizophaga (rī-zof'a-ga), root-eaters; one of the sections of the *Marsupialia* (which see).

Rhizophora (rī-zof'u-ra), the mangrove genus of plants. See *Mangrove.*

Rhizopoda (rī-zop'o-da), the lowest class of the Protozoa, comprehending animals which are destitute of a mouth, are single or compound, and possess the power of emitting pseudopodia. They are mostly minute, frequently microscopical, but some (such as the sponges) attain considerable size. Structurally the rhizopods consist of a mass of sarcode, are destitute of organs

RHODE ISLAND

Douglass Jc.
E.Thompson
Thompson
Bridgeton
Pascoag
Harrisville
Glendale
Whipple
Slatersville
Nasonville
Oakland
Tarklin
Fields Sta.
Primrose
Manville
Albion
Woonsocket Jc.
Blackstone
Forestdale
Woonsocket
Blackstone
Arnold Mills
Abbott Run
Diamond Hill
N.Attleboro
Attleboro
Attleboro Jc.
Whittenton Jc
Weir Jc.
Ashton
Berkeley
Cumberland Mills
East Jc.
Lime Rock
Lonsdale
Valley Falls
Sayles'V.
Darlington
Central Falls
Pawtucket
Woodlawn
Smithfield
Stillwater Res.
Stillwater
Harmony
Georgia V.
Waterman Reservoir
Enfield
Greenville
Greystone
Centerdale
Allendale
H. Lymansville
Manton
Dyerville
Olneyville
Arlington
Thornton
Cranston
Knightsville
Auburn
Meshanticut
S.Auburn
Lakewood
Norwood
Howard
Hills Grove
Shawomet
Greenwood
Warwick
Buttonwoods
Cowesett
Crompton
Washington
Arkwright
Pontiac
Phenix
Natick
River Pt.
Apponaug
Fiskeville
Hope
Oakland
Moosup Valley
Mt.Misery
Coventry
Greene
Summit
Centerville
Quidnick
Anthony
Weeks Hill
W.Greenwich Center
Carr Pond
Escoheag
Nooseneck Hill
Austin
Davisville
East Greenwich
PATIENCE I.
North Pt.
HOG I.
Bristol Ferry
Bristol
Bristol Bay
Mt. Hope
Tiverton
N.Tiverton
Fall River
Somerset Jc.
Bowenville
Warren
Barrington
Narragansett R.
Providence R.
Pawtuxet
Drownville
Riverside
Silver Spring
Roger Williams Park
India Pt.
E.Providence
PROVIDENCE
Phillipsdale
Rumford
S.Prov.
Woonasquatucket R.
Pawtuxet R.
Chopmist Hill
N.Scituate
Killingly Pond
Foster
Moswansicut Pond
Foster Center
Ashland
Rockland
S.Scituate
Bennett Hill
Pawtuxet
Hopkinton
Alton
Ashaway
Potter Hill
Shannock
Carolina Sta.
Wood River Jc.
Wood R.
Pawcatuck R.
White Rock
Niantic
Westerly
Watchaug Pond
Charlestown
Perryville
Point Judith Pond
Greenhill
Point Judith Neck
Pt.Judith
Squid Ledge
Quonochontaug
Avondale
Pawcatuck R.
Rocky Pt.
Weekapaug
Noyes Pt.
Watch Hill
Napatree Pt.
Sandy Pt.
Salt Pd.
BLOCK I.
Block I.
Wickford Jc.
La Fayette
Quonset Pt.
Wickford
Belleville
Allenton
Hamilton
Saunderstown
DYERS I.
GOULD I.
Middletown
RHODE I.
Bradford
Tiverton Four Corners
Noquit Pond
Adamsville
Little Compton
Sakonnet R.
Sakonnet Pt.
Jamestown
Newport
ISLAND ROCKS
Brenton Reef
Narragansett Pier
Point Judith
Pt.Judith
Portsmouth
Prudence
HOPE I.
PRUDENCE I.
CONANICUT I.
NARRAGANSETT BAY
BLOCK ISLAND SOUND
ATLANTIC OCEAN
MASSACHUSETTS
CONNECTICUT
RHODE ISLAND
Scale of Miles
0 1 2 3 4 5 10
A Longitude B West 71° 30′ from C Greenwich D

for digestion, etc. The characteristic from which they have their name is their capability of protruding processes (pseudopodia) from any part of their substance, sometimes as filaments or threads and sometimes finger-shaped, and retracting them at pleasure. Some, as the Foraminifera, are invested with a calcareous shell, sometimes consisting of one cell, but generally of an aggregation of minute chambers or cells, through the pores of which they protrude their fiber-like processes. The class has been divided into five orders — Monera, Amœba, Foraminifera, Radiolaria, and Spongida, though the last named, while resembling the protozoa in the character of their cells, being metazoin in structure, and usually considered a separate class. See separate entries.

Rhode Island (rōd' i'land), the smallest State of the American Union, bounded on the N. and E. by Massachusetts, W. by Connecticut, and S. by the Atlantic Ocean. Its total area is 1248 square miles, of which 197 are water. The surface, which in the north is hilly and rugged, but elsewhere generally level, is penetrated in the east by Narragansett Bay, a fine body of water about 30 miles long by 15 miles broad, and containing several islands, among them the one which gives the state its name. The chief rivers are the Pawtucket, the Pawtuxet, and the Pawcatuck. The climate is mild and equable, and well adapted, from its pleasant summers and temperate winters, for invalids from the south. The minerals include coal, iron ore, and limestone; sandstone, marble, and serpentine are sufficiently common. There are extensive granite quarries. The soil is only of indifferent fertility, though Aquidneck Island has excellent soil and produces butter of high repute. Manufactures form the staple industry; they consist of cotton, woolen, worsted, and mixed textiles, jewelry, and foundry and machine-shop products, silverware, rubber and elastic goods. The chief religious denominations are the Baptists, Congregationalists, Episcopalians, and Methodists, the Baptists having the largest membership. The higher education is provided for by Brown University at Providence, one of the oldest colleges in the country. There is a state agricultural and mechanical college at Kingston and a state normal school at Providence. The chief cities are Providence, Pawtucket, Woonsocket, and Newport, the first three manufacturing cities. Rhode Island is one of the six New England states, and one of the original thirteen which formed the American Union. It was colonized by Roger Williams in 1630, its government being remarkable for that period in permitting entire freedom in religious matters. It was the last state to ratify the Federal Constitution, this not being done until 1790. Originally containing two colonies, Rhode Island and Providence Plantations, it had two capitals, Providence and Newport, until 1900, when the former was made the sole capital. Providence had once a large ocean trade, but this has become unimportant. Newport has become the most fashionable of American seaside resorts and Narragansett Pier is a noted watering place. Pop. 542,610.

Rhode Island, an island situated in Narragansett Bay, from which the state of Rhode Island takes its name. It is about 15 miles long from north to south, and 3½ wide. and is divided into three townships — Newport, Portsmouth, and Middletown. It is fertile, pleasant, and healthful, and is a noted resort for invalids from southern climates.

Rhodes (rodz), CECIL JOHN, a South African promoter, was born at Bishop-Stertford, England, July 5, 1853. Going to Natal for his health, he became interested in diamond mining, and eventually gained a controlling ownership in the Kimberley mines. He took an active part in South African politics, entered the ministry in 1884, and was prime-minister of Cape Colony 1890-96, when he resigned on account of charges of his connection with the Jameson raid. In 1889 he procured a charter for the British South Africa Company, conducted a war with the natives in Bechuanaland in 1893, and in 1896 put down a formidable rising of the Matabeles. His services in securing this region for Great Britain were acknowledged by its being named Rhodesia. He was in Kimberley during its siege by the Boers in 1899, they being eager to capture him, as they held him largely responsible for the war. An ambitious project of his was the building of a railway from the Cape to Cairo, traversing the entire length of Africa. This project has been in part accomplished. He died March 26, 1902, establishing by his will Rhodes Scholarships in Oxford University for students from the British colonies and the United States, also from Germany.

Rhodes (rōdz), an island in the Ægean Sea, belonging to Turkey, off the southwest coast of Asia Minor, from which it is separated by a channel 10 miles broad; area, 424 sq. miles. It is traversed north and south by an elevated mountain range, the

highest point of which, Atairo, reaches a height of 4560 feet. Great part of the rest of the island is occupied by hills of more moderate elevation, which are covered with woods of ancient pines. The climate is delightful, and the soil fertile, producing grain, grapes, figs, pomegranates, oranges, etc. Steam navigation direct to the island has been established, and commerce is rapidly increasing. Pop. est. 30,000 to 35,000, of whom two-thirds are Greeks, the remainder Turks and Jews. Rhodes was a celebrated island in antiquity. It was settled by Dorians from Greece, and the Rhodians soon became an important maritime people, and for several centuries the island was a great seat of literature, art, and commerce. In A.D. 44 it was made part of the Roman province of Asia. It is famous for its prolonged defense by the Knights of St. John from 1309 till 1522, when they were forced to abandon the island to the Turks, with whom it has remained ever since.—RHODES, the capital, stands at the northeastern extremity of the island, rising from the sea in the form of an amphitheater, with fortifications mainly the work of the Knights of St. John. There are few remains of the ancient city, which was founded by the Dorians 408 B.C., and became one of the most splendid of ancient Greek cities. The celebrated Colossus of Rhodes stood for fifty-six years, and was prostrated by an earthquake 224 B.C. (See *Colossus.*) Pop. about 10,000.

Rhodesia (rō-dē'si-a), the country subject to the sway of the British in South Africa. So-called from Cecil Rhodes, who was chairman of the company and instrumental in conquering it. It is sometimes called Zambesia, from the Zambesi River, which traverses it, and divides it into Southern and Northern Rhodesia. It lies north of Bechuanaland and the Vaal River Colony. Southern Rhodesia has an area of 174,728 sq. miles, is rich in minerals, has forests of hardwood timber and a soil and climate adapted to European cereals. Capital Salisbury. Pop. est. 240,000. Northern Rhodesia, or Central Africa, area 251,000 sq. miles, lies between the Portuguese possessions and extends north to the Congo Free State and German East Africa. The country is well watered and suitable for stock-raising, and the growth of wheat; valuable fiber plants abound and coal and gold are found.

Rhodez. See *Rodez.*

Rhodium (rō'di-um), a metal belonging to the platinum group, discovered by Wollaston in 1804. It is of grayish-white color, very ductile and malleable, hard and very infusible, unaltered in the air at ordinary temperatures, but oxidizes at a red heat. It has been used for the points of metallic pens.

Rhodium Oil, a balsamic, volatile oil obtained from Canary Island rosewood, the woody root of *Convolvulus scoparius* and *floridus.* It is employed as a perfume, but there is also an artificial perfume so-called.

Rhododendron (rō-du-den'dron), a genus of evergreen shrubs with alternate, entire leaves, and ornamental flowers disposed in corymbs, belonging to a suborder of the Ericaceæ (heaths), and chiefly inhabiting the mountainous regions in Europe, North and South America, and Asia. The varieties are very numerous, and are much cultivated in gardens. The colors of the flowers range through rose, pink, lilac, scarlet, purple, red and white. *R. chrysanthum*, a Siberian species, possesses narcotic properties; *R. ferrugineum*, found in Switzerland, is called the rose of the Alps. *R. Dalhousiæ* is an epiphytic species. Dr. Hooker found *R. nivale* on the Tibetan mountains at a height of 16,000 to 18,000 feet. Major Madden states that in Kumaon *R. arboreum* grows to a height of 40 feet.

Rhodope (rō'do-pē), the ancient name of a range of mountains in European Turkey, partly forming the western boundary of Eastern Roumelia, and now called Despoto-Planina.

Rhombus (rom'bus), in geometry, a quadrilateral figure whose sides are equal and the opposite sides parallel, but whose angles are unequal, two being acute and two obtuse.

Rhondda (rond'da), a river in Glamorganshire, South Wales, which flows 14 miles S. E. through the Rhondda Valley to the Taff at Pontypridd. The Rhondda parliamentary division of Glamorgan consists of the township of Ystradyfodwg (which see).

Rhône (rōn; Latin, *Rhodănus*), a river in Europe which rises in Switzerland, near the east frontiers of the canton of Valais, about 18 miles W. S. W. of the source of the Vorder-Rhein. Its precise origin is the Rhône Glacier, 5581 feet above the level of the sea. It passes through the Lake of Geneva, and enters France, flowing first

southwards and then westwards to the city of Lyons, where it turns almost due south, and so continues till (after passing Avignon and Arles) it falls into the Gulf of Lyons by a greater and a smaller mouth, forming here an extensive delta. (See *Camargue.*) Its principal affluent is the Saône, which enters it at the city of Lyons; other large tributaries are the Isère and Durance. Its whole course is about 500 miles; its drainage area is 38,000 miles; and it is navigable for 360 miles. The great obstacles to its navigation are the rapidity of its current, the shifting character of its channel, and the variations that take place in the volume of its water; but these obstacles have to a great extent been removed by a recent scheme of regularization and canalization, intended to secure everywhere a depth of over 5 feet. By means of a series of magnificent canals the navigation of the Rhône has been continued, without interruption, to the Rhine (through the Saône), the Seine, and the Loire, and to the Meuse and the Belgian system.

Rhône, a department in France, in the basin of the Rhône, to which it sends its waters by the Saône (with the Azergues) and the Gier; area, 1077 square miles. The soil is only moderately fertile, and the wealth of the department is derived from its manufactures, the chief of which is silk, others being cottons and woolens, linens, machinery, and metal goods. The city of Lyons is the capital. Pop. 858,907.

Rhône, Bouches du. See *Bouches-du-Rhône.*

Rhubarb (rö'barb; *Rheum*), a genus of plants belonging to the nat. order Polygonaceæ. The species of this genus are large-leaved, herbaceous plants, natives of a considerable portion of Central Asia, with strong branching, almost fleshy roots and erect branching stems 6 to 8 feet high. They usually possess more or less purgative and astringent properties; this is essentially the case with their roots, and hence these are largely used in medicine. The principal kinds of medicinal rhubarb have received such names as Russian or Turkey, East Indian, Himalayan, Chinese, and English, according to their source or the route by which they have reached Europe. At present most of the Asiatic rhubarb comes from China, the plant yielding it being mostly *R. officināle.* English rhubarb is derived from *R. Rhapontieum,* which has long been cultivated for medical purposes in some parts of England as well as on the European continent, and is widely grown in the United States as a garden plant. The leaf-stalks of this species, as well as of *R. undulātum* and others, are now largely used for tarts, puddings, jam, etc., and the juice is made into a kind of wine.

Rhumb-line. See *Loxodromic Curve.*

Rhumbs (rums), the points of the compass. See *Compass.*

Rhus. See *Sumach.*

Rhyl (ril), a watering-place of North Wales, in Flintshire, near the mouth of the Clwyd. It has pure air and a fine sandy beach, with all the equipments of a watering-place, and possesses the charm of a most interesting country at the back. Pop. 9005.

Rhyme (rīm), more correctly Rime (A. Saxon, *rîm,* number), in poetry, a correspondence in sound of the terminating word or syllable of one line of poetry with the terminating word or syllable of another. To constitute this correspondence in single words or in syllables it is necessary that the vowel and the *final* consonantal sound (if any) should be the same, or have nearly the same sound, the initial consonants being different. English writers have allowed themselves certain licenses, and we find in the best English poets rhymes which strike an accurate ear as incorrect, such as *sky* and *liberty, hand* and *eommand, gone* and *alone.* Such rhymes may be tolerated if they only occur at rare intervals, but they must certainly be regarded as blemishes. If the rhyme is only in the last syllables, as in *forgave* and *behave,* it is called a *single* rhyme; if in the two last syllables, as *bitter* and *glitter,* it is called a *double* rhyme; if in the last three syllables, as *eallosity* and *reciprocity,* it is called a *triple* rhyme. This last sort of rhymes is principally used in pieces of a comic or conversational character. Rhymes which extend to more than three syllables are almost confined to the Arabians and Persians in their short odes (*gazelles*), in which the same rhyme, carried through the whole poem, extends sometimes to four and more syllables. The modern use of rhyme was not known to the Greeks and Romans; though some rhymed verses occur in Ovid. It has been used, on the other hand, from time immemorial among the Chinese, Hindus, Arabs, and other oriental nations. Rhyme began to be developed among western nations in the Latin poetry of the Christian church. It is found used as early as the fourth century. The early English, German, and Scandinavian poems are distinguished by allitera-

tion instead of rhyme. (See *Alliteration.*) The Troubadours first attempted a variety of artificial combinations of rhyme in the sonnet, canzone, etc., and the Spaniards and Italians, with their musical languages and delicacy of ear, perfected the various forms of involved rhyme.

Rhymer (rī′mėr), Thomas, of Erceldoune, or Earlston, in Berwickshire, otherwise called Thomas the Rhymer, was a half-legendary Scottish poet or romancer of the thirteenth century. He is mentioned by Barbour, Blind Harry, and Wyntoun, was credited with prophetical powers, and his *Prophecies*, a collection of oracular rhymes, were long popular in Scottish folk-lore. The old metrical romance of *Sir Tristram* is doubtfully ascribed to him.

Rhymney (rim′ni), a town in South Wales, chiefly in Monmouthshire, partly in Brecknock, on the river Rhymney, 22 miles N. of Cardiff, has large iron and steel works, including blast furnaces and rolling-mills. Pop. (1911) 13,336.

Rhynchonella (rin-ko-nel′la), a genus of brachiopodous molluscs. As many as 250 fossil species are numbered from the lower Silurian upward, but only two or three living species are known, inhabiting the deeper parts of the Arctic and Antarctic Oceans.

Rhynchops (rin′kops). See *Scissorbill.*

Rhythm (rithm), in general, means a measured succession of divisions or intervals in written composition, music, or dancing. The rhythm of poetry is the regular succession of accent, emphasis, or voice stress; or a certain succession of long and short (heavy and light) syllables in a verse. Prose also has its rhythm, and the only difference (so far as sound is concerned) between verse and prose is, that the former consists of a regular succession of similar cadences, or of a limited variety of cadences, divided by grammatical pauses and emphases into proportional clauses, so as to present sensible responses to the ear at regular proportioned distances. In music, rhythm is the disposition of the notes of a composition in respect of time and measure; the measured beat which marks the character and expression of the music.

Rhytina (rī-tī′na), a genus of mammalia, closely allied to the manatee and dugong, which has become extinct within the last century or so. The only known species of Rhytina (*Rhytina Stelleri*) was discovered in 1741 by the Russian naturalist Steller on an island in Bering's Straits, on which he and a party of sailors had been shipwrecked. The animals were fish-like in shape, and of great size — specimens measuring 25 feet in length and 20 feet in greatest circumference. The head was small. The tail-fin was crescentic in form, and front limbs only were developed.

Rialto (rē-al′tō). See *Venice.*

Riazan, or Ryazan (ryå-zån′), capital of a government of the same name in Central Russia. The town is situated on the Trubesh, a tributary of the Oka, in the center of a rich agricultural district, and has a large trade, more especially in rye. Manufactures include woolens, linens, needles, and leather. Pop. 44,552.— The government has an area of 16,254 square miles, and is wholly drained by the Oka and its tributaries. The surface on the right of the Oka is largely swampy and has extensive forests; on the left it is generally fertile. Cereals of all kinds are produced for export. The principal manufactures are cotton, linen, leather, and spirits. Pop. 1,827,085.

Rib, the name given to the curved bones which in man and the other vertebrates spring from either side of the spine or vertebral column, and which may or may not be joined to a sternum or breast-bone in front. The ribs ordinarily agree in number with the vertebræ of the back or dorsal region. Thus in man twelve dorsal vertebræ and twelve pairs of ribs exist. The *true* or sternal ribs are the first seven, which are articulated at one extremity of the spine, and at the other to the sternum by means of cartilages. The *false* or short ribs are the remaining five; the uppermost three being united by their cartilages to the cartilage of the last *true* rib. The others are free at their sternal extremity, and hence have been called 'floating ribs.' Ribs are wanting in such lower fishes as lampreys, lancelets, etc., and in amphibians such as frogs and toads. The number of these bones may be very great in certain species, and they are occasionally developed in the cervical and pelvic regions in reptiles and birds respectively.

Rib, in architecture, a term applied variously, as for instance to an arch-formed piece of timber for supporting the lath and plaster work of a roof; a plain or ornamented molding on the interior of a vaulted roof; to the moldings of timber roofs, and those forming tracery on walls and in windows.

Ribble (rib'l), a river of Yorkshire and Lancashire, rises at Wharnside Mountain, and flows generally S. and S. W. till it expands below Preston into an estuary of the Irish Sea. Since 1885 vast river diversion works, and the construction of a dock at Preston, have been going on, which, when completed, will greatly improve the navigation of the river.

Ribbon (rib'un), a narrow web, generally of silk, used for tying and ornamental purposes. Ribbon-weaving is a special branch of the textile industries. In modern looms as many as forty ribbons are simultaneously woven in one machine. Ribbon-weaving was established near St. Étienne in France in the eleventh century. In England Coventry is an important seat of this industry, which is also carried on at Norwich and Leicester, and in various parts of the United States. Mixed fabrics of silk and cotton are now largely employed. The terms *blue ribbon* and *red ribbon* are often used to designate the orders of the Garter and Bath respectively, the badge of the former being supported by a blue ribbon, and that of the latter by a red ribbon.

Ribbon-fishes, the name of certain deep-sea fishes met with in all parts of the ocean, generally found floating dead on the surface, or thrown ashore by the waves. The body is like a band from 15 to 20 feet long, 10 to 12 inches broad, and an inch or two thick. These fishes are generally silvery in color. They live at such a depth that when they reach the surface the expansion of gases in the body so loosens all parts of the muscular and bony system that some portions are nearly always broken on lifting them out of the water. The fin rays in young ribbon-fishes are extraordinarily developed, some of them being several times longer than the body. The deal-fish (*Trachypterus arcturus*) is often met with in the North Atlantic, and is sometimes found after gales on the Scottish coasts. See *Deal-fish, Oar-fish.*

Ribbon-grass, CANARY-GRASS, a garden variety, striped with green and white, of *Phalaris arundinacea*, a grass which is found in its wild state by the sides of rivers. Called also *gardener's garters.*

Ribbonmen, the members of a secret society organized among the Roman Catholics in Ireland about the beginning of the last century in opposition to that of the Orangemen. It originated in Armagh, and spread thence to Down, Antrim, Tyrone and Fermanagh. The organization of the society was similar to that of the Orangemen, but by no means so complete. The membership from the first was drawn almost exclusively from the lowest classes of the population.

Ribbon-worms, a group of annuloid animals belonging to the suborder Nemertida, a division of the order Turbellaria of the Platyelmia or 'Flat-worms.' The leading characteristics of ribbon-worms are an elongated, worm-like body, an alimentary canal terminating in a distinct anus, and a protrusible proboscis. These forms are marine in habits, and are not parasitic. The sexes are generally separate, and reproduction may be subserved by ova, by gemmation or budding, or by division of the body substance.

Ribe (rē'be), or RIPEN, a town of Denmark, in the southwest of Jutland, on the Ribe, about 3 miles from its mouth. It has a cathedral of the twelfth century, and was once a flourishing port. Pop. 4243.

Ribeauville (ri-bō-vēl). Same as *Rappoltsweiler.*

Ribe'ra, GIUSEPPE. See *Spagnoletto.*

Ribes (rī'bēs), a genus of plants of the natural order Grossulariaceæ, comprehending the gooseberry and the currants. A species with scarlet flowers (*R. sanguineum*), and a variety of this with white flowers, are much cultivated as ornamental shrubs.

Ricardo (rē-kar'do), DAVID, a celebrated writer on finance and political economy, was the son of a Jewish stock broker, and was born in London in 1772; died in 1823. In 1793 he embraced Christianity and married a Christian wife. He then began business as a stock broker on his own account, and in a short time realized an immense fortune. His first publication was on the subject of the depreciation of the national currency (1810). He then published an *Essay on Rent*, and his name is usually associated with a certain distinctive view on this subject. (See *Rent.*) In 1816 he wrote a pamphlet entitled *Proposals for an Economical and Secure Currency.* But his most important work is his *Treatise on Political Economy and Taxation*, which appeared in 1817. In 1819 he entered parliament as member for Portarlington. In 1822 he published a pamphlet on *Protection to Agriculture.* Though his mode of treatment is totally different, he belongs essentially to the school of Adam Smith.

Ricciarelli (rit-chä-rel'lē). DANIELE, better known by the

name of DANIELE DA VOLTERRA, an Italian painter, born at Volterra in 1509. He studied painting at Siena, and afterwards repaired to Rome, where he was much indebted to the friendship of Michael Angelo, who not only instructed him, but gave him designs for some of his most celebrated works. His fame rests chiefly on a series of frescoes in the church of La Trinità de' Monti, Rome; and of these the *Descent from the Cross* is well known by Toschi's admirable engraving. Ricciarelli was employed by Paul IV to partially drape the nude figures in Michael Angelo's *Last Judgment* in the Sistine Chapel of the Vatican. By this act he earned for himself the soubriquet of *Il Braghettone* (The Breeches-maker). In the latter part of his life Ricciarelli applied himself also to sculpture. He died at Rome in 1566 or 1567.

Riccio. See *Rizzio*.

Rice (rīs; *Orȳza satīva*), a cereal plant, natural order Graminaceæ or Grasses. This important food-plant was long known in the East before it was introduced into Egypt and Greece. It is now cultivated extensively in the low grounds of the tropical and subtropical parts of southeastern Asia, Egypt, Japan, part of the Southern United States, and in several districts of Southern Europe. The culm of the rice is from 1 to 6 feet high, annual, erect, simple, round, and jointed; the leaves are large, firm, and pointed, arising from very long, cylindrical, and finely striated sheaths; the flowers are disposed in a panicle somewhat resembling that of the oat; the seeds are white and oblong, but vary in size and form in the numerous varieties. In the cultivation of this plant a high summer temperature is required, combined with abundance of water. Thus the seaboard areas and river deltas which are subject to inundation give the best conditions, otherwise irrigation is necessary. The amount of water required by the plant depends upon its strength and stage of growth. In Egypt it is sown while the waters of the Nile cover the land, and the rice plant grows luxuriantly in the rich alluvial deposits left by the receding flood. The Chinese obtain two crops a year from the same ground, and cultivate it annually on the same soil, and without any other manure than the mud deposited by the water of the river used in overflowing it. The young plants are transplanted into plowed furrows, and water is brought over them and kept on till the plants begin to ripen. The first crop is cut in May, and a second is immediately prepared for by burning the stubble, and this second crop ripens in October or November. In India two harvests are obtained in the year, especially in Bengal, and frequently two crops are taken from the same field. In Japan, the Philippines, Ceylon, and Java rice is cultivated much in the same manner. Mountain rice is a hardy variety which thrives on dry soil; and in India it is cultivated at an altitude of 8000 feet. Rice can be profitably cultivated only in warm countries, but has for some time past been grown in South Germany and Italy. In the United States it is grown chiefly in the swampy districts of South Carolina, Georgia, Louisiana and Texas. In the husk rice is known by the name of 'paddy.' Rice is more largely consumed by the inhabitants of the world than any other grain, the people of Eastern Asia and its islands largely living on it; but it contains less flesh-forming matter (nitrogenous), than the others, this element being, in 100 parts of rice, only 6.5. At one period Europe was supplied from America, but this source has been almost entirely superseded by Lower Burmah, India, Siam, Japan, and Cochin-China. The inhabitants of the East obtain from rice a vinous liquor more intoxicating than wine; and *arack* is also made from it. See *Arack*.

Rice (*Orȳza satīva*).

Rice, INDIAN. See *Canada Rice*.

Rice-bunting, a name given to two distinct birds. The first, also known by the name 'bob-o'-link,' is the *Emberiza oryzivŏra* (or *Dolichonyx oryzivŏrus*), a bird of the bunting family, which migrates over N. America from Labrador to Mexico, appearing in Massachusetts about the be-

Rice-bunting (*Oryzornis oryzivŏra*).

ginning of May. Its food is insects, worms, and seeds, including rice in South Carolina. It is the reed bird of the Middle States, pausing in its migration to feed on the seed of the riverside reeds. The song of the male is singular and pleasant. When fat their flesh becomes little inferior in flavor to that of the European ortolan. The other species known as the rice-bunting is the *Oryzornis oryzivŏra*, also known as the Java sparrow and paddy bird. It belongs to the true finches, a group nearly allied to the buntings. It possesses a largely-developed bill; the head and tail are black, the belly rosy, the cheeks of the male white, and the legs flesh-colored. It is dreaded in Southern Asia on account of the ravages it commits in the rice-fields. It is frequently brought to Europe, and is found in aviaries.

Rice-paper, a substance prepared from thin, uniform slices of the snow-white pith of *Aralia papyrifera*, which grows in Formosa. Rice-paper is prepared in China, and is used in the manufacture of artificial flowers and by native artists for water-color drawings.

Rich, Edmund, an English ecclesiastic, born at Abingdon about 1195. He studied theology at Paris, afterwards taught the Aristotelian logic and scholastic philosophy in Oxford, and was prebendary and treasurer of Salisbury Cathedral 1219-22. He preached the sixth crusade in 1227, became archbishop of Canterbury in 1233, and exhibited great energy as a reformer. His authority was superseded by that of the legate, Cardinal Otho, and being unable to obtain redress at Rome he retired to France in 1240 and died in 1242. He was canonized in 1249.

Richard I, King of England, surnamed Cœur de Lion, second son of Henry II by Eleanor of Aquitaine, was born at Oxford in 1157. He several times rebelled against his father, and in 1189, supported by the King of France, he defeated the forces of Henry, who was compelled to acknowledge Richard as his heir. On Henry's death at Chinon, Richard sailed to England and was crowned at Westminster (September, 1189). The principal events of his reign are connected with the third crusade, in which he took part, uniting his forces with those of Philip of France. In the course of this crusade he married the Princess Berengaria of Navarre in Cyprus. In the crusade he showed himself a warrior of great strength and boldness, but made enemies of his fellow princes by his autocratic demeanor. Richard left Palestine in 1192 and sailed for the Adriatic, but was wrecked near Aquileia. On his way home through Germany he was seized by the Duke of Austria, whom he had offended in Palestine, and was given up a prisoner to the Emperor Henry VI. During his captivity his brother John headed an insurrection in England in concert with the King of France, but Richard, who was ransomed, returned to England in 1194, and the movement came to nothing. Richard then passed over to Normandy, and spent the rest of his life there in warfare of no decisive character. He died in April, 1199, of a wound received while besieging the castle of Chalus. Richard was thoroughly neglectful of his duties as a king, and owes his fame chiefly to his personal bravery.

Richard II, King of England, son of Edward the Black Prince, and grandson of Edward III, was born at Bordeaux in 1366. He succeeded the latter in 1377. In 1381 took place the insurrection headed by Wat Tyler, in the suppression of which the boy-king showed considerable capacity and boldness, but his after life did not correspond with this early promise. In his sixteenth year (1382) he married Anne, daughter of the Emperor Charles IV. Wars with France and Scotland, and the ambitious intrigues of the Duke of Lancaster, one of his uncles, disquieted some succeeding years. The proper government of the kingdom was interfered with by contests for power between the king with his favorites, and his uncle, the Duke of Gloucester, backed by the parliament. In 1389 the king dismissed Gloucester and his adherents from his council, and took the reins of government himself. In 1394 Anne of Bohemia died, and two years later Richard married Isabella of France. This marriage was strongly opposed by the Duke of Gloucester, who, in consequence, was suffocated in Calais, where he had been sent for safe custody. . A quarrel having broken out between Richard's cousin, the Duke of Hereford, son of John of Gaunt, and the Duke of Norfolk, Richard banished them both. The next year, 1399, the Duke of Lancaster died, and Richard confiscated his estates. This unjust act was the immediate cause of the king's fall. During his absence in Ireland, Bolingbroke, as the Duke of Hereford was called, landed in Yorkshire with a small force, and the king on his return to England was solemnly deposed by parliament, September 30, 1399, and the crown was awarded to Henry. (See *Henry IV.*) Richard was imprisoned

in the castle of Pomfret, where he is generally supposed to have been murdered in 1400.

Richard III, King of England, the last of the Plantagenet kings, born at Fotheringhay Castle in 1450, was the youngest son of Richard, Duke of York, who was killed at Wakefield. On the accession of his brother, Edward IV, he was created Duke of Gloucester, and during the early part of Edward's reign served him with great courage and fidelity. He took for wife in 1473 Anne Neville, joint-heiress of the Earl of Warwick, whose other daughter was united to the Duke of Clarence, and quarrels soon rose between the two brothers over their wives' inheritance. On the death of Edward in 1483, the Duke of Gloucester was appointed protector of the kingdom; and he immediately caused his nephew, the young Edward V, to be declared king, and took an oath of fealty to him. But Richard soon began to pursue his own ambitious schemes. Earl Rivers, the queen's brother, and Sir R. Grey, a son by her first husband, were arrested and beheaded at Pomfret, and Lord Hastings, who adhered to his young sovereign, was executed without trial in the Tower. It was now asserted that the king and his brother were illegitimate, and that Richard had a legal title to the crown. The Duke of Buckingham supported Richard, and a body of peers and citizens having offered him the crown in the name of the nation he accepted it, and on July 8, 1483, was crowned at Westminster. The deposed king and his brother were, according to general belief, smothered in the Tower of London by order of their uncle. (See *Edward V.*) Richard governed with vigor and ability, but was not generally popular, and in 1485 Henry, Earl of Richmond, head of the house of Lancaster, landed with a small army at Milford Haven. Richard met him on August 23d with an army of 15,000 men at Bosworth, in Leicestershire. Richmond had only 6000 men, but relied on the secret assurances of aid from Stanley, who commanded a separate royal force of 7000. In the midst of the battle, Stanley, by falling on the flank of the royal army, secured the victory to Richmond, Richard being slain on the field. (See *Henry VII.*) Richard possessed courage as well as capacity; but his conduct showed cruelty, dissimulation, treachery, and ambition. He has been represented as of small stature, deformed, and of a forbidding aspect; but his personal defects have probably been magnified.

Richard, Earl of Cornwall and Emperor of Germany between 1256 and 1272, during the so-called interregnum, was a son of King John of England, and was born in 1209. In his youth he commanded with success the army of his brother Henry III in France. In 1236 he took the cross and went to the Holy Land, but was not able to effect much in the East. In 1256 he was chosen Emperor of Germany by a faction, and was crowned King of the Romans at Aix-la-Chapelle in 1257. He was unable to obtain general recognition, and was more than once driven to take refuge in England, where he was taken prisoner by Simon de Montfort at the battle of Lewes in 1264. In 1268 he again visited Germany, and held a diet at Worms in the following year. He died in England April 2, 1272.

Richard of Cirencester, or RICARDUS CORINENSIS, a monkish chronicler of the fourteenth century, sometimes called the Monk of Westminster. He entered the Benedictine monastery of St. Peter's, Westminster, residing there during the remainder of his life; in 1391 he visited Rome. He died in his monastery about 1402. He is the author of a Latin history of England to the year 1348. The so-called *Itinerary of Richard, 'De Situ Britanniæ,'* published in 1758, and formerly much referred to as an authority on Roman Britain, was a forgery perpetrated by Dr. C. J. Bertram of Copenhagen.

Richards, WILLIAM FROST, painter, was born at Philadelphia, Pennsylvania, Nov. 14, 1833; died Nov. 8, 1905. He studied art in Europe, had a studio in London 1878-80, and resided many years in his native city. Among his well-known pictures are *Midsummer Woods in June*, *Old Ocean's Gray and Melancholy Waste*, and *The Wissahickon*, the last exhibited at the Centennial Exposition in 1876. His later works are chiefly marine pictures.

Richardson (rich'ard-son), SIR BENJAMIN WARD, was born at Somerby, Leicestershire in 1828, was graduated in medicine at St. Andrew's University in 1854. In 1885 he edited the *Journal of Health;* and he gained the Astley Cooper prize by his treatise on *The Cause of the Coagulation of the Blood*, and the Fothergillian gold medal by a disquisition on the *Diseases of the Fœtus*, in 1856. He originated the use of ether spray for the local abolition of pain in surgical operations, and introduced methylene bichloride as a general anæsthetic. He was a fellow of the

Royal College of Physicians and of the Royal Society, and was the president of the Medical Society of London. He published several works upon medicine and hygiene, and was an earnest sanitary and temperance reformer. He was knighted in 1893 and died in 1896.

Richardson, CHARLES, lexicographer, was born in 1775; died in 1865. He was trained as a barrister, but devoted himself to literature. In 1815 he published *Illustrations of English Philology.* In 1818 he undertook the lexicographical articles in the *Encyclopædia Metropolitana,* and afterwards published his great work. a *New Dictionary of the English Language* (2 vols. 1835-37). He also wrote a work on the *Study of Languages* (1854), and contributed frequently to the *Gentleman's* and other magazines.

Richardson, SIR JOHN, naturalist and Arctic traveler, born at Dumfries in 1787; died near Grasmere in 1865. After studying medicine at the University of Edinburgh he entered the royal navy, in 1807, as assistant-surgeon. He served on various stations till 1819, and was surgeon and naturalist to the Arctic expeditions of 1819-22 and 1825-27, under Sir John Franklin, exploring on the latter occasion the shores of the Arctic Ocean between the Mackenzie and Coppermine rivers. He wrote *Geognostical Observations* as an appendix to the *Narrative* published by Franklin (1829, London), and edited, along with Kirby and Swainson, the *Fauna Boreali-Americana* (4 vols., 1829-37). In 1838 he was appointed physician to the fleet, and in 1846 was knighted. In March, 1848, he took charge of an expedition to search for Franklin, and on his return published *The Arctic Searching Expedition* (1851) and *The Polar Regions* (1861).

Richardson, SAMUEL, an English novelist, was born in 1689 in Derbyshire, and received only a common school education. He early manifested a talent for story-telling and letter-writing, and at the age of thirteen was the confidant of three young women in their love secrets, and employed by them in their amatory correspondence. At the age of sixteen Richardson was bound apprentice to Mr. John Wilde, a London printer, and afterwards set up as a printer for himself and developed a successful business. When he was nearly fifty he was asked by two booksellers to compose a 'familiar letter writer.' In doing this he threw the letters into the form of a story, which he published (1741) under the title of *Pamela, or Virtue Rewarded.* So great was its popularity that it ran, through five editions in one year, and was even recommended from the pulpit. In 1749 the appearance of a second novel, *Clarissa Harlowe,* fully established his literary reputation. The *History of Sir Charles Grandison* appeared in 1753, and was also received with great praise. In 1754 Richardson became master of the Stationers' Company, and in 1760 purchased a moiety of the patent of law printer to the king. He died July 4, 1761, and was buried in the Church of St. Bride, in Fleet Street.

Richelieu (rēsh-ly*eu*), ARMAND JEAN DU PLESSIS, CARDINAL, DUC DE, a famous French statesman, born at Paris, September 9, 1585; died there, December 4, 1642. He was the son of François Duplessis, seigneur de Richelieu in Touraine, and was originally destined for the army; but his brother, Alphonse, having resigned the bishopric of Luçon, this was bestowed on him by Henry IV (1606). He obtained from the pope a dispensation allowing him to accept the office though under age, and in 1607 was consecrated by the Cardinal de Givry in presence of the pope himself (Paul V). For several years he devoted himself to the duties of his see, reforming abuses, and laboring for the conversion of Protestants. But his ambition always made him turn his eyes towards the court, and having come to Paris in 1614 as deputy of the clergy of Poitou to the states-general, he managed to insinuate himself into the favor of the queen-mother, Marie de Medici, who obtained for him the post of grand-almoner, and in 1616 that of secretary of state for war and foreign affairs. When Louis XIII quarreled with his mother (1617) Richelieu fell with her, and was banished first to Blois and then to Avignon. In 1620, however, he managed to effect a reconciliation between Mary of Medici and her son. He now obtained, through the influence of the queen-mother, the cardinal's hat, and in 1624 was admitted into the council of state. From this date he was at the head of affairs, and he at once began systematically to extend the power of the crown by crushing the Huguenots, and overthrowing the privileges of the great vassals; and to increase the influence of the French monarchy by undermining that of the Hapsburgs, both beyond the Pyrenees and in Germany. The rallying point of the Huguenots was Rochelle; and Richelieu laid siege to that city, commanding the army in person. Rochelle, supported by supplies from England, held out for some time, but was compelled to surrender by famine (Oct. 29,

1628). In order to overthrow the power of the great nobles he ordered the demolition of all the feudal fortresses which could not be used for the defense of the frontiers. After the suppression of the Huguenots his next step was the removal of the queen-mother from court, she having endeavored to effect his fall. This he accomplished in November, 1630. But this step, and the almost total annihilation of the privileges of the parliaments and the clergy, united all classes against the despotism of the cardinal, and several risings and conspiracies took place, which were suppressed by prudent and vigorous measures. In 1631 Richelieu was raised to the rank of duke. In 1632 a rising in favor of the Duke of Orleans, the king's brother, was suppressed by the royal forces directed by Richelieu, and the Duke of Montmorency was executed. The whole period of his government was marked by a series of conspiracies of the feudal nobility, the queen-mother, the queen herself, and even Louis, against the royal power exercised by Richelieu. But he was prepared at every point and his vengeance sure. During the Thirty Years' war the cardinal employed all the arts of negotiation and even force of arms to protect the Protestants of Germany, for the purpose of humbling the power of Austria. For the same object he declared war against Spain in 1635, and the separation of Portugal from Spain was effected by his assistance (1640). He also endeavored to weaken Austrian influence in Italy, and procured the transfer of the duchy of Mantua to the Duke of Nevers. Among the last to be crushed by him were Cinq-Mars and De Thou, who, with the king's approval, attempted to ruin the great minister. Before his death he recommended Cardinal Mazarin as his successor. Richelieu was a great statesman, but he was proud, arrogant, and vindictive. He was a patron of letters and art, and founder of the French Academy and the Jardin des Plantes.

Richmond (rich'mund), an ancient municipal borough of England, in the county of and 42 miles northwest of York (North Riding), on the left bank of the Swale. It is picturesquely situated, and has numerous interesting remains of antiquity, the most remarkable of which is the castle, comprising an area of nearly 6 acres, and one of the most majestic ruins in England. Pop. (1911) 3934.

Richmond, a town of England, in the county of Surrey, 12 miles w. s. w. of London, partly on an acclivity of Richmond Hill, and partly on a plain along the Thames. It is a favorite resort of Londoners for boating and other recreations, the scenery in the vicinity being very beautiful, and the view from Richmond Hill one of the finest river views to be obtained anywhere. Richmond was a favorite residence for many centuries of the monarchs of England, several of whom died there. The great park of Richmond, formed by Charles I, is enclosed by a brick wall 8 miles in length. Pop. (1911) 33,223.

Richmond, a city in Contra Costa Co., California. It has oil and brick industries. Pop. 6802.

Richmond, a city, capital of Wayne Co., Indiana, 68 miles E. of Indianapolis. It is an important industrial center, with extensive manufactures of farming implements, threshing machines, machinery, furniture, undertakers' supplies, brass and iron goods, etc. There is here a State Insane Asylum and Earlham College. Pop. 22,324.

Richmond, a city of Kentucky, capital of Madison Co., 25 miles S. E. of Lexington. Iron, coal and lumber are abundant in the vicinity and fine stock is raised and shipped. There are iron, coal, and tobacco industries, etc., and two collegiate institutions. Pop. 5340.

Richmond, the capital of Virginia, is finely situated on the north side of James River, at the head of tidewater, 100 miles S. by W. of Washington. The streets are generally wide and well built, and mostly intersect each other at right angles. There are many fine buildings, including the capitol, governor's house, city hall, federal buildings, buildings of Richmond College, the Jefferson Davis Mansion (now a museum of Confederate relics), the Chief Justice Marshall residence, exposition buildings, Soldiers' Home, etc. The State House or Capitol contains Houdon's celebrated marble statue of Washington, and in the Capitol grounds are Foley's bronze statue of General T. J. ('Stonewall') Jackson and Crawford's bronze statue of Washington, 25 feet high, on a pedestal 42 feet high, surrounded by other bronze statues. There is a fine system of parks, a national cemetery and the famous Hollywood Cemetery in which are the graves of Presidents Monroe and Tyler, John Randolph, Jefferson Davis, and others of note. There are a number of collegiate institutions. Water-power is almost unlimited, and the various mills and factories give employment to numerous workmen, the tobacco and iron industries being of great importance. The trade staples are tobacco, iron, grain, and flour.

The first occupation of any part of its site was by English settlers in 1609; the city was formally founded in 1742, and became the seat of government in 1780. During the Civil war it was the seat of the Confederate government. It was invested by the Federal armies, and surrendered on April 3, 1865. Pop. 127,628.

Richmond, BOROUGH OF, Greater New York, embraces the whole of Staten Island. Pop. 85,969. See *Staten Island.*

Richter (rik'tėr), EUGEN, a German politician, born at Düsseldorf in 1838. He entered the Prussian Diet in 1869, and the Imperial Diet in 1871, and became the able and acknowledged leader of the Progressist Liberals.

Richter, GUSTAV, a German painter, born at Berlin in 1823; died there in 1884. He was a member of the Academies of Berlin, Munich, and Vienna; executed frescoes in the Berlin Museum, and attracted attention by his *Raising of Jairus' Daughter* and his *Building of the Pyramids,* a colossal picture (at Munich). It is on his portraits, however, that his fame chiefly rests, his sitters having included many European celebrities.

Richter, JEAN PAUL FRIEDRICH, commonly called JEAN PAUL, a German writer, was born March 21, 1763, at Wunsiedel, in the Fichtelgebirge, and died November 14, 1825, at Baireuth. His father was, at the time of his birth, a teacher and organist at Wunsiedel; at a later period pastor at Schwarzenbach on the Saale. In 1781 Richter entered the University of Leipzig in order to study theology, but soon changed his plan, and devoted himself to literature. In 1784 he was forced by poverty to leave Leipzig. In 1787-94 he was a private tutor, but in the meantime he had published his *Grönlandische Processe* ('Greenland Lawsuits,' 1783-84), *Auswahl aus des Teufels Papieren* ('Selection from the Devil's Papers,' 1789), and *Die unsichtbare Loge* ('The Invisible Lodge,' 1793). This brought him fame and money, and was followed by another romance, *Hesperus* (1795), and *The Life of Quintus Fixlein* (1796), a humoristic idyl, works which made his name one of the best known in Germany. In 1798 he went to Weimar, and subsequently moved to other towns, finally settling at Baireuth in 1804. He shortly afterwards received a pension from the prince-primate. Dalberg, which was afterwards continued by the King of Bavaria. While staying in Berlin in 1801 he married Karoline Mayer, a union which proved very happy. His last years were saddened by the death of his only son in 1821. Jean Paul's works (he wrote under this name) are characterized by a deeply reflective and philosophic humor, but are often whimsical and fantastic. They are full of good things, but show no sense of proportion, arrangement, or artistic finish. His writings, other than those noted above, include *Blumen-, Frucht-, und Dornenstücke* ('Flower, Fruit, and Thorn Pieces,' 1796), *Der Jubelsenior* ('Parson in Jubilee,' 1797), *Das Kampaner Thal* (1797), *Titan* (1800), *Flegeljahre* (translated by Carlyle 'Wild Oats,' 1804). *Die Vorschule der Aesthetik* ('Introduction to Æsthetics'), his first important philosophical work, appeared in 1804. It was followed by *Levana, oder Erziehungslehre* (1807), a work on education. His works connected with the history and politics of the time were: *Friedenspredigt* (1808), *Dämmerungen für Deutschland* (1809); *Mars und Phöbus' Thronwechsel im Jahr 1814* (1814), and *Politische Fastenpredigten* (1817).

Richthoven (rik'to-fėn), FERDINAND BARON VON, traveler, born at Karlsruhe, Silesia, in 1833; died in 1905. For twelve years, 1860-72, he traveled in Europe and the Western United States and was subsequently professor of geology at Rome, and of geography at Leipzig and Berlin. In 1902 he was made director of the Institut für Meeneskunde. His works on the geography and geology of China are of high value.

Ricimer (ris'i-mėr), a general of barbarian descent who ruled the western Roman Empire by emperors whom he set up and put down at will. He dethroned Avitus in 456, and appointed Majorianus emperor, whom he caused to be assassinated in 461. He then placed Livius Severus on the throne, and on his death in 465 he carried on the government for some time alone. In 467 Arthemius was put on the throne, and gave his daughter in marriage to Ricimer. The latter soon took up arms against his father-in-law, who was assassinated in 472. Ricimer died soon after.

Ric'inus. See *Castor-oil.*

Rickets (rik'ets), a disease peculiar to infancy, chiefly characterized by changes in the texture, chemical composition, and outward form of the bony skeleton, and by altered functions of the other organs, transient for the most part, but occasionally permanent. The chief external features are the legs bent outward, chest unduly projecting, head large and forehead projecting, spine

often curved, joints large and prominent, general form stunted, etc. Rickets is chiefly a disease of large cities, and its development is favored by want of nourishing food, overcrowding, and neglect of sanitary and hygienic precautions generally. In the treatment of rickets all means are employed by which the system is invigorated, including good food, fresh air, and exercise. The use of splints for the legs is often beneficial, and as the child grows up nature often remedies the worst features.

Ricochet Firing (rik'u-shā, or shet), the firing of guns, mortars, or howitzers with small charges and low elevation, so as to cause the balls or shells to bound along. It is very destructive, and is frequently used in sieges to clear the face of a ravelin, bastion, or other work, dismounting guns and scattering men; and may also be used against troops in the field.

Rideau Canal (ri-dō'), a Canadian canal constructed between Kingston on Lake Ontario and Ottawa as a through waterway by means of the river Ottawa to Montreal, the St. Lawrence route being interrupted by rapids. Canals have since been built along the St. Lawrence to avoid these, and the Rideau is now little used.

Ridgewood, a village in Bergen Co., New Jersey, 22 miles from New York, and 5 miles N. E. of Paterson. Pop. 5416.

Ridgway, borough, capital of Elk Co., Pennsylvania, 118 miles S. E. of Erie. Engines. machinery, dynamos, edge-tools, etc., are manufactured. Pop. 5408.

Rider's Bone, or RIDER'S STRAIN, a hard lump which sometimes forms on the inner side of the thigh in persons who ride much.

Riding (rīd'ing) is the art of sitting on horseback with firmness, ease, and gracefulness, and of guiding the horse and keeping him under perfect command. Walking, trotting, and galloping are the three natural paces of the horse, but these may be converted into artificial paces by art and skill, by shortening or quickening the motion of the horse. The position of a rider should be upright in the saddle; the legs and thighs should be turned in easily, so that the fore part of the inside of the knees may press and grasp the saddle, and the legs hang down easily and naturally, the feet being parallel to the horse's sides, neither turned in nor out, only that the toes should be kept a little higher than the heels. The hand holding the reins is generally kept clear of the body, and immediately over the pummel of the saddle. A firm and well-kept balanced position of the body is of the utmost consequence, as it affects the horse in every motion, and the hands and legs ought to act in correspondence with each other in everything, the latter being always subservient to the former. The art of riding is not difficult of attainment, but it is one which can only be mastered by practical instruction and constant practice.

Ridings (rīd'ings), the three jurisdictions into which the English county of York is divided on account of its extent. They are called the North, East, and West Ridings.

Ridley (rid'li), NICHOLAS, Bishop of London in the reigns of Edward VI, and his successor Mary, was born about the commencement of the sixteenth century, and educated at Cambridge. He afterwards traveled on the continent for three years, and on his return filled the office of proctor to Cambridge University. In 1547 he was chosen to the see of Rochester, and in 1550 superseded Bonner as Bishop of London. On the death of Edward he was involved in an attempt to secure the Protestant ascendency by placing the Lady Jane Grey upon the throne. This, together with his connection with Cranmer, led to his being tried for heresy, and after a formal disputation on the controverted points with a deputation of Roman Catholic bishops he was condemned to the stake. This sentence he underwent with the greatest fortitude, in company with his friend and fellow-sufferer Latimer, Oct. 16, 1555, in Oxford.

Ridpath (rīd'path), JOHN CLARK, historian, born in Putnam Co., Indiana, in 1840; died Aug. 1, 1900. He became professor of English literature in Asbury University, Ind., in 1867 and its vice-president in 1879. He published a *History of the United States* in 1875, a *Cyclopedia of Universal History*, 1880-84, and *Great Races of Mankind*, 1894.

Riel, LOUIS, a Canadian revolutionist, born at Boniface, Manitoba, in 1844, son of a half-breed Indian. He became a leader of revolts against the English, was elected to the Dominion parliament, but not allowed to take his seat, and after this twice organized rebellions among the Indians and western settlers. He was taken prisoner in 1880, tried for treason and executed.

Rienzi (rē-en'zē), COLA DI, a native of Rome, born about 1312. He was the son of a tavern-keeper, acquired a good education, and early dis-

tinguished himself by his talents, and especially by his attacks on the tyranny of the nobles. In 1342 he endeavored to induce Pope Clement VI, then at Avignon, to initiate reforms, but nothing was done. In 1347, during the absence of the governor of Rome, Stefano Colonna, Rienzi summoned a secret assembly of his friends upon Mount Aventine, and induced them all to subscribe an oath for the establishment of a plan of government which he called the 'good estate.' The people conferred upon him the title of tribune, with all the attributes of sovereignty. He banished several noble families, and compelled Colonna to quit Rome. His strict regard to justice and the public good in the first exercise of his power induced even the pope to countenance him. But he subsequently became ambitious and haughty, and finding he had lost the confidence of the people he withdrew from Rome in 1348. He returned secretly to Rome in 1350, but was discovered, and fell into the hands of Pope Clement at Avignon, who imprisoned him for three years. Innocent VI released Rienzi, and sent him to Rome to oppose another popular demagogue named Boroncelli. But after a turbulent administration of a few months he was killed in 1354.

Riesa (rē'zȧ), a town in Saxony, on the left bank of the Elbe. It has a large river trade and various industries. Pop. (1905) 14,073.

Riesengebirge (rē'zen-gė-bir-gė; Giants' Mountains), a mountain range of Europe, separating Silesia from Bohemia and Moravia, till it joins the Carpathians; but the name is properly applied to that part of this range which lies between the sources of the Neisse and the Bober. It contains the loftiest mountains of the north or central parts of Germany, the Schneekoppe being 5257 feet high. The geological structure of the range consists of granite, gneiss, and mica slate, and in the valleys there are coal and basaltic strata.

Riesi (rē-ā'sē), a town in Sicily, province of Caltanissetta. It has large sulphur mines, and the olive and vine are here extensively cultivated. Pop. 11,914.

Riet-bok (rēt-bok), the Dutch name for an antelope of South Africa, which lives in reedy marshes (*Elcotrăgus arundinaceus*). Called also *Reed-buck*.

Rieti (rē-ā'tē), a town in Italy, in the province of Perugia, 42 miles N. N. E. of Rome. It is the see of a bishop, has an imposing cathedral, and manufactures of silk and woolen stuffs, etc. Pop. 9845.

Riff, or El Rif (rēf), a district on the north coast of Morocco, long the home of pirates, who gave great trouble to the European powers by their depredations in the Mediterranean.

Rifle (rī'fl), a portable firearm, the interior surface of the barrel of which is grooved, the channels being cut in the form of a screw. The number of these spiral channels or threads, as well as their depth, varies in different rifles, the most approved form being with the channels and ridges of equal breadth, and the spiral turning more quickly as it nears the muzzle. The bullet fired is now always of an elongated form. The great advantage gained by a weapon of this construction is that the bullet discharged from the piece, by having a rotatory action imparted to its axis coincident with its line of flight, is preserved in its direct path without being subject to the aberrations that injure precision of aim in firing with unrifled arms. As a necessary consequence of the projectile being carried more directly in its line of aim, its length of range, as well as its certainty in hitting the object, is materially increased. Rifles were invented in Germany in 1498, and have been used as military weapons since 1631, but were not used in the British army until the latter half of the eighteenth century; and till 1851 the British infantry, with the exception of those regiments known as rifle corps, was universally armed with the smooth-bore musket. In 1851 the first rifle firing an elongated bullet came in under the name of the Minié. After this date came the general adoption of the breech-loading rifle, the reduction in bore and weight of weapon, and subsequently the development of magazine rifles, now commonly in use in all armies. In the United States the Springfield rifle was the army weapon from 1873 to 1892, when it was replaced by a Scandinavian magazine rifle, the Krag-Jorgensen. In 1902 the Springfield, now converted into a magazine rifle, was adopted as the army weapon. In ordinary use the Winchester has long been a favorite. In European armies various weapons are in use. In Britain the Martini-Henry was adopted in 1869; now replaced by the Lee-Metford weapon. In Europe the Mauser is the weapon in use in several countries; the Chassepot, Krag-Jorgensen, etc., in others. This class of magazine rifle is being replaced in some countries by one which acts automatically, ejecting the empty shell

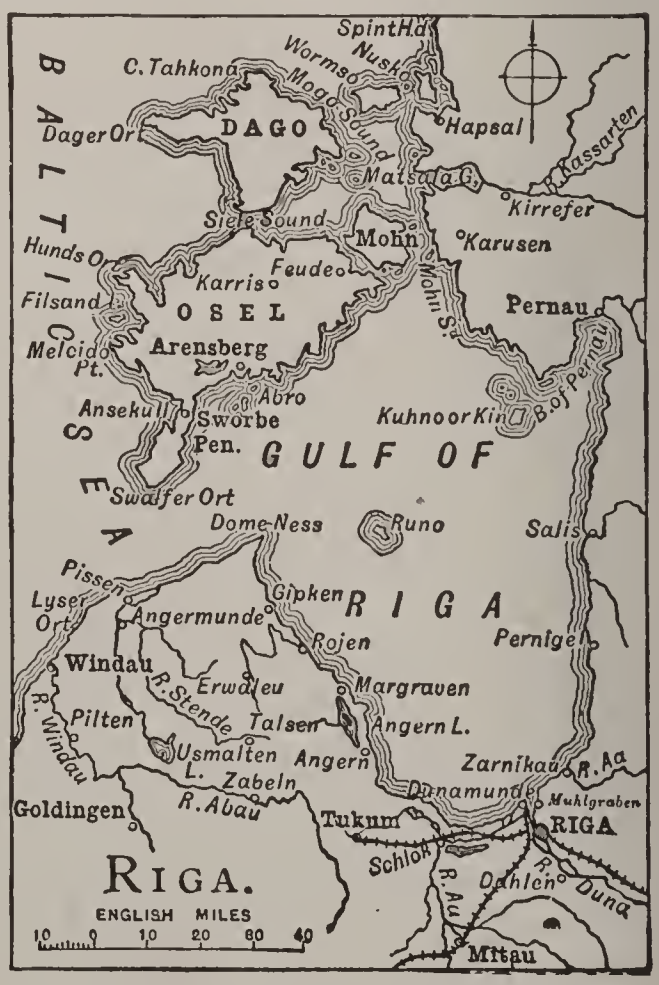
and bringing forward another cartridge by the force of the discharge. These will fire 300 bullets per minute, but their weight and complexity and the waste of ammunition in this rapid scattering of bullets are objections to their use. Since 1906 a new sharp-pointed bullet has been adopted in the United States and several other countries.

The repeating rifle is a development of a very old type of weapon. In the Spencer, the first used with signal success, the cartridges are placed in the stock of the arm; in the Winchester, the best known of repeating rifles, they are in a tube underneath the barrel. More modern military magazine rifles draw their supply of cartridges from a reserve contained in a detachable magazine, the advantage being the greater efficiency of the weapon as a single loader. The Lebel rifles, originally furnished with a tubular magazine, are now being converted to the more modern type. The breech mechanism usually preferred is that upon the 'door-bolt' principle, of which the Chassepot and Prussian needle-gun are well-known types; the Winchester is one of the few actuated by an under lever, and the Colt is worked by a sliding boss placed under the barrel. In the Mannlicher the bolt is drawn back simply; in others it has to be turned to the left before it can be withdrawn. With the Lebel the breech-bolt has two projections, which, when the bolt is turned, securely lock the bolt close to the base of the cartridge; in the Enfield-Lee, a similar double-locking arrangement is placed where the projecting knob to actuate the mechanism joins the breech-bolt. The magazine of the Enfield-Lee, containing eight cartridges, is placed under the stock behind the barrel, to the level of which a spiral spring in the magazine raises the cartridges. The breech-bolt, which contains the firing mechanism and extractor, when pushed forward forces the raised cartridge into the barrel. The magazine is detached by pressing a 'catch,' or blocked by a 'cut-off,' when the rifle may be used as a single loader.

When Whitworth produced his hexagonal bore rifle of .450 caliber, it was thought that the bullet was of insufficient diameter, and the .577 was adopted in its stead; later, after twenty years' experience with the .450 Martini-Henry, the bore has been still further reduced, chiefly owing to the discoveries of Hebler, whose Swiss rifle of 7½ millimeters was found to give increased velocity, greater range, equal accuracy, and at the same time permitted of lighter ammunition being used. The bullet is coated with thin steel, ferro-nickel or other hard metal, so that it shall not strip in the rifling, which has a sharp twist, one complete turn in less than 12 inches, and leaves the muzzle at a velocity of 2000 or more feet per second, thus giving an extreme range of 3500 yards. Improved explosives, almost smokeless and which do not foul the barrel, have added to the success of the small-bore rifle. Sporting rifles have a shorter range and inferior velocity to the best military ones.

The Mauser is a magazine rifle in which the cartridge-holder or clip consists merely of a strip of metal curved at its edges to enfold the flanged heads of the cartridges. The magazine is placed centrally under the receiver and shells are forced from the clip into the magazine from above. The breech mechanism has the ordinary sliding and turning bolts for the operation of charging the rifle. The bore is 0.256 in. A charge of 30 grains of smokeless powder ejects a bullet of 220 grains with deadly force to over 1000 yards. The bullet is a lead slug jacketed with a thin cover of steel, the length being about 3 calibers.

Riga (rē'gȧ), a seaport of Russia, capital of the government of Livonia, on both sides of the Duna or Dwina, about 5 miles above its mouth in the Gulf of Riga. It is situated on a sandy flat, and in the older parts consists



of narrow, winding streets, huddled together, while the more modern parts are much better built. The river is crossed by a bridge of boats, and on both sides are spacious quays, which afford excellent promenades. The public buildings are numerous, but few of them are deserving of particular notice, except the cathedral, a Gothic building of the thirteenth and sixteenth centuries, St. Peter's Church, the castle or governor's residence, and the town-hall. The manufactures are not of great importance, but the trade is very extensive, the principal exports being flax, hemp, timber, linseed, grain, etc. Ships can come up to the town, or they may unload and take cargo in at Dünamünde, the port and fortress at the mouth of the river. Half of the trade is with Britain. Pop. 256,197, of whom nearly half are Germans, and Protestants by religion.

Riga, or LIVONIA, GULF OF, a gulf of the Baltic, which washes the coasts of Courland, Livonia, and Esthonia, and contracts in the west to a comparatively narrow entrance, the island of Osel almost closing it on the northwest. The chief river which it receives is the South Dwina.

Right, PETITION OF. See *Petition of Right.*

Right Ascension. See *Aseension.*

Right of Way, the right of passing over land not one's own. Rights of this kind are public if enjoyed by everybody; private, if enjoyed by a certain person or class of persons. Wherever there is a public right of way, there is a highway. The origin of a highway is generally said to be in a dedication thereof by an owner to the public; and such dedication may be expressed or implied. It will be implied from the use of the highway by the public for a moderate number of years. But a highway may also be established by act of legislature. A private right of way may be grounded on a special permission, as where the owner grants to another the liberty of passing over his land. Twenty years' occupation of land, adverse to a right of way and inconsistent therewith, bars the right.

Rights, BILL AND DECLARATION OF. See *Bill.*

Rights of Man, a theoretical declaration passed by the French National Assembly in August, 1789. It was attacked by Edmund Burke in his *Reflections on the French Revolution.* Thomas Paine vigorously replied to Burke in his *Rights of Man.* See *Paine, Thomas.*

Rigi (rē′gē), an isolated rocky mountain of Switzerland, in the canton of Schwyz, between Lakes Zug and Lucerne, 5905 feet high. It affords one of the finest views in Switzerland, and is annually visited by numerous travelers. Two railways have been constructed to reach its summit (Rigi-Kulm) from opposite sides. They are on the 'rack-and-pinion' principle, there being a central toothed rail into which works a toothed wheel under the locomotive. There is also a short line on the mountain worked on the ordinary principle. Hotels and similar establishments are numerous on the Rigi.

Rigor Mortis (rig′ur mōr′tis), the rigidity of limbs that follows death. It is one of the signs of cessation of life.

Rig-veda (rig-vē′da), the first and principal of the Vedas or sacred hymns of the Hindus. See *Vedas.*

Riis, JACOB AUGUST, born at Ribe, Denmark, in 1849, emigrated to New York and became a police reporter on the *Sun.* As such he studied the poor of that city, and his book, *How the Other Half Lives,* created a sensation in philanthropic circles in New York. He wrote other telling books on this subject, also *Theodore Roosevelt, the Citizen* (1904), *The Old Town* (1909).

Rilievo (rē-lē-ā′vō). See *Relief.*

Riley (rī′li), JAMES WHITCOMB, poet, born at Greenfield, Indiana, 1853. He became a sign-painter, afterward a strolling player, and then an editorial writer on the Indianapolis *Journal.* In 1873 he began contributing poems to newspapers in the middle western dialect, these poems attaining great popularity. Among his books are: *The Old Swimmin' Hole, The Boss Girl, Character Sketches and Poems, Afterwhiles, Pipes o' Pan at Zekesbury, Green Fields, Raggedy Man, Old Schoolday Romanees,* etc.

Rimini (rē′me-nē; anciently *Arimĭnum*), a town of N. Italy, in the province of Forlì, on the Marecchia, less than a mile from its mouth in the Adriatic. It is surrounded with walls, and entered by four gates; has a cathedral, built in the fourteenth but remodeled in the fifteenth century, after the designs of Leon Battista Alberti; the Church of San Giuliano, with a superb altar-piece, by Paul Veronese; the Church of San Girolamo, with a fine painting by Guercino; the triumphal arch of Augustus, of simple and massive architecture; and the bridge of Augustus over the Marecchia, built of white marble, and still in perfect preservation. The har-

bor is now so silted up as to admit only small vessels. Pop. 18,022.

Rimu (rē′mū), a New Zealand tree (*Dacrydium cupressinum*) of the yew family. It grows to a height of 80 to 100 feet, and from 2 to 6 feet in diameter. Its wood is valued for general building purposes.

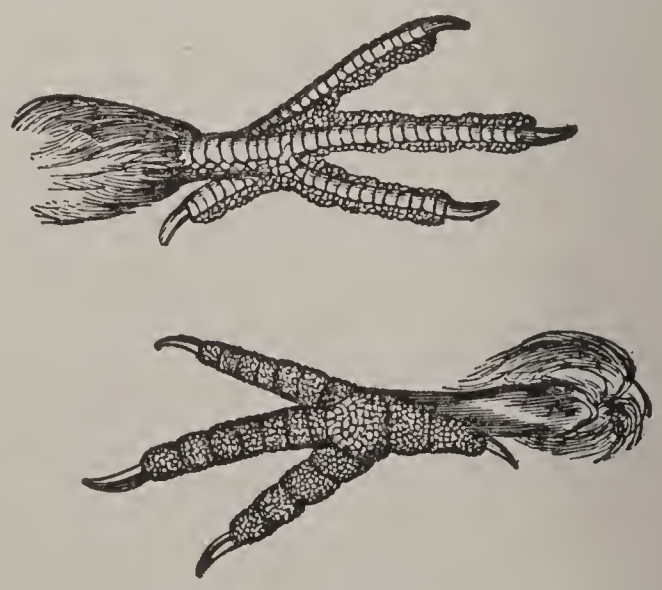
Rinderpest (rin′dėr-pest; German name), or CATTLE-PLAGUE, a contagious disease which attacks animals of the ox family, and is attended with the most deadly results. The disease appears to be identical with what was formerly known as murrain, and is sometimes called the steppe-murrain, from the Russian steppes, which are its habitat. This disease has caused great havoc among cattle for at least a thousand years, spreading occasionally like a pestilence over Europe. In 1865-67 there was a very serious visitation of it. The treatment of the disease having proved a failure, the policy of 'stamping-out' or killing all infected animals was adopted; while cattle fairs having proved powerful instruments in transmitting the disease, the movements of cattle were subjected to the most stringent regulations. During this outbreak between 200,000 and 300,000 cattle died of the plague in Britain, or were ordered to be killed on account of it. These measures were attended with beneficial results. It reappeared again in 1867, but was speedily controlled. In 1870 it still prevailed in Europe, 130,000 cattle dying in France alone. In 1896 a serious epidemic of it broke out in Africa, supposed to have been introduced by the Italian army during the war in Abyssinia, and spread with great rapidity, reaching South Africa by the end of the year and destroying thousands of antelopes and other wild animals in addition to cattle. The probable cause of the disease is a micro-organism which is found in the blood and all the discharges of the infected animals, and is capable of being transmitted indirectly by any of these to great distances. Sheep and other animals can be affected by the disease, but in a less intense form. The period of incubation varies from two to ten days. The symptoms are elevation of the temperature of the body, followed by a heightened color of the mucous membrane of the mouth, and granular, yellowish eruptions on the gums, lips, tongue, palate, and cheeks.

Ring, an ornament for the fingers which has been worn from the most ancient period of civilization. Among the ancient nations who are known to have attached special importance to the wearing of rings were the Assyrians, Egyptians, Hebrews, Greeks, and Romans. The nose, ears, arms, and even the legs and toes have also, among various people, been decorated with them. Rings have also from a very early period been reckoned as symbols of authority, which could be delegated by merely delivering the ring to an agent; they were also used as symbols of subjection. The earliest mention of rings is in the book of Genesis, and relates to the Hebrews. Among the Egyptians rings of gold were worn in great profusion. The common people wore porcelain rings. The Greeks and Romans used them for sealing contracts, closing coffers, etc. The modern use of wedding rings was probably derived from the Jews. A ring appears from an early period to have been one of the insignia of a bishop. Doctors were formerly expected to wear a ring on the third finger of the right hand.

Ringbone, an exostosis or bony tumor mostly met with on the coronet of overworked horses, but sometimes seen on colts, or even newly-dropped foals. Ringbone injures a horse's market value, and is practically incurable.

Ring-dotterel (*Charadrius hiaticŭla*), a species of plover pretty common in Britain, where it frequents the shores of bays or inlets of the sea and rivers, feeding on worms, insects, small crustacea, etc. It has its name from a white ring round the neck.

Ring-dove, or CUSHAT (*Columba palumbus*), the largest of the pigeons inhabiting Europe, occurring very generally throughout the wooded parts of the continent. It is migratory in countries in which the severe winters preclude the possibility of its obtaining a



Ring-dove.
Upper and Under Views of the Foot of the Wood-pigeon (*Columba palumbus*).

due supply of food, and appears on the approach of winter to assemble in flocks, and to perform a limited migration, probably in search of food. A bluish-gray color prevails generally over the head, cheeks, neck, back, and rump, while the breast and under parts of the neck are of a purplish red, the belly and thighs dull white. A patch of white on either side of the neck forms a sort of ring or collar. The average length is about 16 or 17 inches. The food of the ring-dove consists of grain, acorns, berries, the leaves and tops of turnips, etc. The nests are composed of sticks and twigs loosely placed together. The birds are wary and shy, and rarely breed in confinement.

Ringed Snake, a harmless colubrine snake (*Tropidonōtus* or *Coluber natrix*), with teeth so small as to be incapable of piercing the skin. It is common in England. It feeds on frogs, mice, young birds, etc., which it swallows alive. It is torpid during winter.

Ring-money, a form of currency consisting of rings which seems to have originated with the Egyptians. It is still used in parts of Africa, and is manufactured in Birmingham for the use of African traders. A similar form of money was found by Cæsar among the Celts of Gaul, and appears also to have prevailed in Britain, as well as among the Scandinavian nations of Northern Europe.

Ring Ouzel. See *Ouzel.*

Ringworm, a chronic contagious disease of the hair, hair-bulbs, and epithelial covering of the skin. It is due to a microscopical fungus, which lays hold upon and preys upon these tissues, and is very contagious. It is known by the decolorization and brittleness of the affected hairs, by the scaly eruption and roundness of the affected patches. Ringworm is most commonly found on the scalp. The treatment of the disease consists in destroying the vitality of the fungus, which is effected by a solution of sulphurous acid or of corrosive sublimate.

Rinmann's Green, same as *cobalt-green.*

Riobamba (rē-ō-bäm'ba), or BOLIVAR, a town of Ecuador, 80 miles northeast of Guayaquil. Pop. 18,000, chiefly Indians.

Rio Branco. See *Branco.*

Rio Bravo, or RIO GRANDE DEL NORTE. See *Norte.*

Rio de Janeiro (rē'o de zhȧ-nā'ro), the capital of the republic of Brazil, and the second largest city of South America, is most beautifully and advantageously situated on the south-eastern coast, on a fine natural harbor formed by a bay of the same name. The city, which has a picturesque appearance from the bay, is built on flat ground along the shore or on the slopes of low hills. Upon nearer approach it is found that the houses are small and mean looking, the streets narrow and ill paved, especially in the older part, and that even the public buildings are without much architectural merit. The finest buildings are the opera-house, senate-house, military barracks, and the national museum, while the churches are chiefly notable for their gaudy interior decorations. A striking feature in the city is the aqueduct, which

brings the water a distance of 12 miles and crosses a wide valley on a beautiful double-tier of granite arches. Among benevolent institutions are the Casa da Misericordia, several other hospitals, and a large lunatic asylum. There are two colleges, medical schools, a naval and military academy, numerous scientific establishments, public schools, national library, a botanical garden, and observatory. At Rio is the chief military arsenal of the republic, while on one of the islands in the bay there is a naval arsenal with docks and building yards. The bay has its entrance, 1700 yds. wide, between Fort St. Juan and Fort Santa Cruz, and extends inwards 15 miles, with a width varying from 2 to 8 miles. It is diversified with numerous islands, surrounded

by hills covered by luxuriant tropical vegetation, and affords safe anchorage for the largest vessels. Manufactures are unimportant, but there is an extensive trade in coffee, sugar, hides, tobacco, timber, etc. The principal imports are linen, woolen, and cotton tissues; iron and steel goods, and provisions and preserved meats. The city is the central terminus of the railways of the country; tramways have also been worked for some time. The first settlement in the neighborhood of Rio de Janeiro was formed by some French refugees in 1555. A Portuguese force took possession of the settlement in 1567, and laid the foundations of a new city, which has grown into the present capital of Rio de Janeiro. Pop. 811,265. — The state of Rio de Janeiro has an area of 26,660 sq. miles, and is decidedly mountainous in the center. It is the best-cultivated section of Brazil, the chief crop being coffee. Immense herds of cattle are reared, and the forests are rich in timber. Pop. 1,300,000.

Rio Grande, a river of West Africa, which enters the Atlantic by an estuary opposite the Bissagos Islands; upper course not well known.

Rio Grande del Norte (rē'ō grän'de del nor'tē), a river of the United States, rising in s. w. Colorado, crossing New Mexico, and from El Paso to the gulf forming the boundary between the United States and Mexico. Its length is estimated at 1800 miles, but it is generally shallow and obstructed by rapids and sandbanks. Its waters are much used for irrigation in New Mexico.

Rio Grande do Norte (dụ nōr'te; Grand River of the North), a maritime state in the northeast of Brazil; area 22,196 square miles. The surface is mountainous, and not generally fertile. Agriculture and cattle-rearing form the principal branches of industry. The capital is Natal or Rio Grande do Norte (pop. 10,000), a seaport at the mouth of the small river, Rio Grande do Norte, exporting some cotton, sugar, etc. Pop. estimated at 410,000.

Rio Grande do Sul (dụ söl), the most southern state of Brazil, bounded partly by the Atlantic, and bordering with Uruguay and the Argentine Republic, has an area of 91,336 sq. miles, and a pop. of about 1,500,000. It is well watered, contains much fertile land, and has a healthy climate. On the coast is the large lake or lagoon of Patos, besides others. The chief occupations of the inhabitants are cattle-rearing and agriculture. Among the population are 100,000 Germans, there being a number of flourishing German settlements. There are some 600 miles of railway. Hides, tallow, horse-hair, bones, etc., are exported.— Rio Grande, or São Pedro do Rio Grande, its former capital, is situated on a peninsula near where the Lake of Patos communicates with the Atlantic. Its houses are mostly of earth, and its streets unpaved. It has an active trade in hides, horse-hair, wool, tallow, etc. Pop. 19,000.

Rioja (rē-ō'*h*å), Francisco de, a Spanish lyric poet, born at Seville about 1600; died in 1659. He became assessor of the supreme tribunal of the Inquisition. As a poet he followed classic and Italian models, and his poems exhibit purity and grace of diction, deep feeling, and a vigorous imagination.

Rioja (rē-ō'*h*å), La, one of the western provinces of the Argentine Republic. It is well watered on the west, but in the east and south there are salt and sand deserts. The climate is dry and healthy. The inhabitants are chiefly engaged in agriculture and cattle-rearing. Excellent wheat, wine, and fruits are produced. Pop. 82,099.— Chief town, La Rioja, at the foot of the Sierra Velasco, in the midst of vineyards and orange groves. Pop. 8000.

Riom (rē-ōṇ), a town of France, in the department of Puy-de-Dôme, 10 miles north of Clermont. The streets are spacious, but the houses, being built of dark lava, present a somewhat gloomy appearance. The chief manufactures are linen, silk, and hardware. Pop. 7839.

Rion. See *Phasis.*

Rio Negro (nē'grō; Spanish 'black river'), the name of numerous streams, of which two are important: — (1) A river of S. America, and principal tributary of the Amazon. It rises in Colombia, and joins the Amazon after a course of about 1000 miles at Manaos, Brazil. Through its affluent, the Cassiquiari, there is direct communication between the Amazon and Orinoco. See *Cassiquiari.* (2) A river of S. America forming the boundary between the Argentine Republic and Patagonia. It rises in the Andes in Chile, and is about 700 miles long. Its current is very rapid, and its bed obstructed with shoals and sand banks.

Rione'gro, a town in the S. American Republic of Colombia, prov. Antioquia, 12 miles s. w. of Medellin. Pop. 18,648.

Rionero in Volture (rē-ō-nā'rō ēn vōl-tö'rā), a town of South Italy, province of

Pottenza, at the foot of Mt. Volture. Pop. 11,383.

Rio Salado. See *Salado.*

Riot (rī′ut), a disturbance of the public peace, attended with circumstances of tumult and commotion, as where an assembly destroys, or in any manner damages, seizes, or invades private or public property, or does any injury whatever by actual or threatened violence to the persons of individuals. By the common law a riot is an unlawful assembly of three or more persons which has actually begun to execute the common purpose for which it assembled by a breach of the peace, and to the terror of the public. A lawful assembly may become a riot if the persons assembled form and proceed to execute an unlawful purpose to the terror of the people, although they had not that purpose when they assembled. The riot acts of England are not in force in the United States, but it is conceived that by the common law the authorities have power to suppress riotous assemblies and punish those participating in them.

Rio Tinto Mines, celebrated copper mines in the southwest of Spain, province of Huelva, south of the Sierra de Aracena, and near the Rio Tinto. Since the recent development of the mines here a town of some 10,000 inhabitants has grown up.

Riouw. See *Rhio.*

Riparian Rights. See *Rivers.*

Ripley (rip′li), GEORGE, editor, was born at Greenfield, Massachusetts, 1802; died July 4, 1880. He was educated at Harvard College and Cambridge Divinity School, became a Unitarian minister in Boston, lived some years in Europe, and was one of the founders of the *Transcendental* magazine, the *Dial* (on which he had Emerson and Margaret Fuller as coadjutors), and the originator and conductor of the communistic experiment at Brook Farm. He became literary editor of the *New York Tribune* in 1849, and was joint editor with C. A. Dana of the *American Cyclopædia* (1858–63, 16 vols.; also of the second edition).

Ripon (rip′un), a cathedral city, formerly a parliamentary borough of England, county of York (West Riding), on the Ure, 22 miles N. N. W. of York. It has a spacious marketplace and an elegant town-hall. The cathedral dates from the latter half of the twelfth century, and is partly Early English, partly decorated in architecture, with two towers, each 110 feet high. It was recently thoroughly restored, and is one of the finest churches in England. The other buildings include a free grammar-school (founded by Queen Mary), an infirmary, and a mechanics' institution. Pop. (1911) 8218.

Riposto (rē-pōs′tō), a seaport in the east of Sicily, prov. Catania, with a trade in wine, oil, etc. Pop. 7238.

Ripple-marks, the wavy or ridgy marks left on the beach of a sea, lake, or river by the ripples or wavelets. Such marks have often been preserved when the sand has hardened into rock, and are held by geologists as indications that deposition of the beds in which they occur took place on the seashore or at a depth not greater than 60 feet. We have also wind ripple-marks and current ripple-marks, and it requires much discrimination to determine the producing cause.

Rishis (rish′ēs), certain sages of the Hindu mythology, sprung from the mind of Brahma. Seven of them are enumerated. The term afterwards came to be applied to all personages distinguished for piety and wisdom.

Rissole (ris′ol), in cookery, an entrée consisting of meat or fish mixed with bread-crumbs and yolk of eggs, all wrapped in a fine paste, so as to resemble a sausage, and fried.

Ristori (rēs-tō′re), ADELAIDE, an Italian actress, born in 1822. At a very early age she played in comedy, but afterwards appeared in tragedy. She married the Marquis Capranica del Grillo in 1847, and afterwards played in all the chief European capitals. She took her farewell of the English stage in Manchester, November 8, 1873. Among her chief characters were *Medea*, *Francesca da Rimini*, *Marie Antoinette*, *Mary Stuart*, and *Lady Macbeth*. She died October 9, 1906.

Ritchie (rich′i), ANNA CORA MOWATT, actor and author, born of American parents at Bordeaux, France, in 1819; died in 1870. She became a favorite actress on the American stage, and wrote *Pelayo*, a poem; *Fashion*, a comedy, and *Armand*, a drama.

Ritornello (rē-tor-nel′lō; Italian), in music, a short repetition as of the concluding phrases of an air; or a passage which is played while the principal voice pauses; or it often signifies the introduction to an air or any musical piece. Ritornelli are also Italian popular songs in stanzas of three lines each. The meter and number of the syllables are not subject to rule. The first line, however, is generally the shortest.

Ritschl (richl), FRIEDRICH WILHELM, a German classical scholar, born in 1806. After attending the gymnasiums at Erfurt and Wittenberg he went to Leipzig and Halle, where he devoted himself to classical studies. In 1832 he was appointed extraordinary professor at Halle University. He subsequently held professorships at Breslau and Bonn, and in 1865 accepted a call to Leipzig University, where he remained until his death in 1876. His chief work is a critical edition of *Plautus' Comedies* (1848-54). His other works include *Parerga Plautina and Terentiana,* and *Priscæ Latinitatis Monumenta Epigraphica.* He also contributed largely to philological journals. He died Nov. 9, 1876.

Ritson (rit'sun), JOSEPH, an English literary antiquarian, born in 1752; died in 1803. He became a conveyancer in London and deputy high bailiff to the Duchy of Lancaster, and edited many old and rare books. He was noted for his industry and integrity, but was a quarrelsome critic. His chief works are: *A Select Collection of English Songs* (1783), *Aneient Songs from the Time of King Henry II to the Revolution* (1790), a *Collection of Scottish Songs* (1794), *Robin Hood Poems* (1795), *Aneient English Metrical Romances* (1802), etc.

Rittenhouse (rit'en-hous), DAVID, astronomer, born at Germantown, Pennsylvania, April 8, 1732; died in June, 1796. He learned the art of clockmaking, and worked at it while engaged in astronomical study. He subsequently engaged in making mathematical instruments, constructed an orrery, and observed the transit of Venus in 1769. He was elected treasurer of Pennsylvania in 1777, and in 1792 became the first director of the mint; was also employed in determining the boundaries of the State. He became president of the Philosophical Society in 1791 and a fellow of the Royal Society of London in 1795. He published many scientific papers in the *Transactions* of the American Philosophical Society.

Ritter (rit'ėr), HEINRICH, a German philosopher, born in 1791, studied theology and philosophy at Halle, Göttingen, and Berlin from 1811 to 1815. In 1824 he became an extraordinary professor of philosophy in Berlin, accepted an ordinary professorship at Kiel in 1833, and subsequently occupied the chair of philosophy at Göttingen University from 1837 till his death in 1869. Ritter's chief work is a general *History of Philosophy.* He also published a *System of Logic and Metaphysics;* a *Cyclopædia of the Philosophical Sciences;* a popular *Treatise on Immortality,* and other works.

Ritter, KARL, a German geographer, born in 1779; died in 1859. He studied at Halle, became a private tutor in 1798, and in 1819 succeeded Schlosser as professor of history at the Frankfort Gymnasium. He then published an *Introduction to the History of European Nations before Herodotus,* 1820; and in the same year became professor extraordinary of geography at the University of Berlin, where he remained until his death. His great work is *Die Erdkunde im Verhältnisse zur Natur und Geschichte des Menschen* ('Geography in its Relations to Nature and History'), the first two volumes of which appeared in 1817-18, but it ultimately comprised upwards of twenty volumes. He wrote several other geographical works, and contributed extensively to the journals of the Berlin Geographical Society.

Ritual (rit'ū-al), the series of rites or ceremonies established in connection with any religion; or the book in which religious services are prescribed and detailed. See *Liturgy.*

Ritualism (rit'ū-al-izm), a strict adherence to rites and ceremonies in public worship. The term is more especially applied to a tendency recently manifested in the Church of England, resulting in a series of changes introduced by various clergymen of the High Church party into the services of the church. These changes may be described externally as generally in the direction of a more ornate worship, and as to their spirit or animating principle, as the infusion into outward forms of a larger measure of the symbolic element. They are defended on the grounds of law, ancient custom, inherent propriety, and divine sanction or authority. The Ritualists hold, with most others, that all authoritative and obligatory regulation upon ritual is not laid down in the New Testament, but they, or many of them, maintain that a knowledge of what is obligatory in ritual is derived from apostolical tradition, going back to apostolical times. They argue that the design of the institution of Christianity was not to abrogate the external ceremonials by which the patriarchal and Mosaic dispensations in the Old Testament were distinguished; but to replace them by a higher ceremonial, and they explain the comparative simplicity of primitive worship by the secrecy and restraint to which the early church was subjected. The points of ritual about which there has been the most violent

contention are those which involve the adoration of Christ as present on the altar under the forms of bread and wine. Other points are: the eastward position of the priest at consecration; lights on the holy table; the use of various vestments; the use of incense; mixing water with wine for communion; fasting before communion from previous midnight; regular confession to a priest, with absolution and penance; etc. The legal position of the Ritualists is that the first Book of Common Prayer, issued in the second year of Edward VI (1549, with alterations made in 1552, 1604, and 1662), is still the guide of the church in all matters pertaining to ritual, the present Prayer-book not being in itself complete, but referring to this first Prayer-book in its opening rubric. Various judgments have been given in ecclesiastical courts against extreme Ritualists, and some of their proceedings have been pronounced illegal. Ritualistic practices have been generally condemned by the bishops, and an act of parliament giving them power to restrain innovations of this kind came into force on July 1, 1875. The ritualistic movement in the Church of England arose out of the high church movement inaugurated by the Tractarians. See *Tractarianism*.

Rive-de-Gier (rēv-dė-zhyā), or simply RIVE, a town of France, department of the Loire, 25 miles E. S. E. of Montbrison, on the Gier. The coal-field which surrounds the town is the most valuable in France. There are glassworks, spinning and other mills, foundries, machine and iron works, etc. Pop. (1906) 15,338.

River-crab, a name given to a genus of crabs (*Thelphusa*), inhabiting fresh water, and having the carapace quadrilateral and the antennæ very short. One species (*T. depressa*) inhabits muddy lakes and slow rivers in the south of Europe.

River-hog, the name occasionally given to the capybara. See *Capybara*.

River-horse, a name sometimes given to the hippopotamus (which see).

Rivers (riv'ėrs) rank high in importance among the natural features of the globe, and are intimately connected with the history and condition of mankind. They have always formed important highways of communication, and the great cities built upon their banks have constituted in all ages the seats of empire. Every circumstance concerning rivers is therefore of importance, as their source, length of channel, outlet, rapidity of current, depth, and consequent capability of navigation. The source of a river is either a spring or springs, or a lake, or the river takes its origin from the melting of the snow and ice on mountains. The termination of a river is usually in the sea, a lake, or another river, or it may lose itself in the sand. All the streams which ultimately gather into one river form a *river system*, and the region which is drained by such a system of streams is called a *river basin*. River basins are usually separated from each other by more or less elevated ground, and the line of greatest elevation between them is called a *watershed*. In speaking of the *right* and *left* bank of a river we are always supposed to have the position of a person looking in the direction towards its mouth. The volume of water which rivers contain varies with many conditions, dependent upon the nature of the sources by which they are fed and the amount of rainfall throughout their course. The periodical melting of the snows adds greatly, in some cases, to the volume of rivers which have their origin in mountain regions; the rainy season in tropical regions has a similar effect (as in the case of the Nile), often causing extensive inundations. In arid countries the so-called rivers are often mere surface torrents, dependent on the rains, and exhibiting merely the dry beds of water-courses during the season of drought. The 'creeks' of Australia and the 'wadies' of the Arabian Desert are of this character. The average fall of a river's bed is indicated by the difference between the altitudes of its source and its outlet compared with its length of channel. The fall of many great rivers is much less than might be supposed. The Amazon has a fall of only 12 inches in the last 700 miles of its course. The Volga, which rises at an elevation of 633 feet above the Caspian Sea, has an average inclination of less than 4 inches to the mile throughout its course of more than 2000 miles. The Aberdeenshire river Dee, which rises at a height of 4060 feet, has a course of only 87 miles to its outlet, showing an average declivity of 46 feet per mile. Many rivers carry down immense quantities of earthy matter, which accumulates at their mouths, forming what is called a *delta* (which see). Among the great rivers of the world are the Mississippi—Missouri (4200 miles) and the Amazon (3900 miles), in America; the Yang-tse-Kiang, the Amoor, the Yenisei, the Indus, and Ganges in Asia, all over 1500

miles in length; the Congo (3000 miles), the Niger (2600 miles), and the Nile (4200 miles), in Africa; and the Danube (1670 miles), Volga (2200 miles), and Rhine (800 miles), in Europe.

By English and other law navigable rivers are held to be the property of the state (so far as navigation extends); non-navigable rivers belong to the proprietors through whose grounds they flow. The state has thus control and jurisdiction of the shores of navigable streams, while in the case of a non-navigable stream the proprietors of estates on opposite banks of it are supposed to own the ground over which it flows respectively to the center of its bed, and may fish it accordingly. They do not own the water, the property in which is shared by the owners above and below. A particular proprietor cannot dam up or divert the water, or alter the banks so as to injure the property of his neighbor. Strict laws for the prevention of pollution of rivers have been enacted by the Legislatures of the different States of the American Union, and in various European countries, this more especially in the vicinity of towns and cities, where the local authorities are charged with their enforcement. This subject has of late years commanded much attention.

Riverside, a city, capital of Riverside Co., California, 16 miles S. of San Bernardino. It has extensive fruit interests, the orange plantations here being the largest in the state. Lemons, figs, raisins also are produced. Pop. 15,212.

River Terraces, terraces on the sides of a valley through which a river flows, formed by the action of the water when the river bed had a higher elevation at some remote period.

River-tortoise, a name of a family of tortoises that are aquatic in their habits, coming to shore only to deposit their eggs. They are exclusively carnivorous, subsisting on fishes, reptiles, birds, etc. The edges of the mandible are so sharp and firm that they can easily snap off a man's finger. Well-known species are the soft-shelled turtle (*Trionyx ferox*) and the large and fierce snapping turtle (*Chelydra serpentina*) of America. (See *Snapping-turtle.*) They inhabit almost every river and lake in the warmer regions in the Old and New Worlds, and are particularly plentiful in the Ganges, where they prey on human bodies.

Rivet (riv′et), a short metallic pin or bolt passing through a hole and keeping two pieces of metal together; especially, a short bolt or pin of wrought iron, copper, or of any other malleable material, formed with a head and inserted into a hole at the junction of two pieces of metal, the point after insertion being hammered broad so as to keep the pieces closely bound together. Rivets are especially employed in making boilers, tanks, iron bridges, steel buildings, etc. They are closed up by hammering when they are in a heated state, the hammering being either done by hand or by machinery.

Riviera (riv-i-ā′ra), the name given to a portion of the coast of North Italy, on each side of the town of Genoa. It extends to Spezzia on the east and Nice on the west, and is much resorted to by invalids.

Riviere (ri-vēr′), Briton, subject and animal painter, was born at London in 1840. He studied art under his father, a drawing-master at Cheltenham and Oxford, and is an Oxford graduate. Among his chief pictures, many of which have been engraved, are: *Strayed from the Flock*, *The Lost Sheep*, *Legend of St. Patrick*, *An Anxious Moment*, *Circe*, *Giants at Play*, *Actæon*, *Væ Victis*, *Rizpah*, *A Fool and His Folly*, etc.

Rivoli (rē′vō-lē), a town of N. Italy, beautifully situated on the last slopes of the Alps, in the province and 8 miles west of Turin. The environs are studded with villas belonging to the inhabitants of Turin, with which it is connected by a magnificent planted avenue. Pop. 7250.

Rivoli-Veronese (ver-ō-nē′sē), a village of North Italy 14 miles northwest of Verona, between Lake Garda and the right bank of the Adige, where Napoleon defeated Alvinczy on January 14, 1797.

Rix Dollar, the English way of writing the names of different silver coins used in various European states, as the *rigsdaler* of Denmark=53 cents; the Swedish *riksdaler*=27 cents.

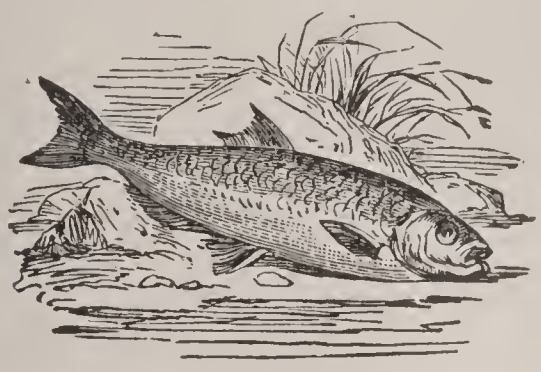
Rizzio (rit′sē-ō), David, a native of Turin, who came to Scotland in 1564 in the train of the ambassador from Savoy, and soon became so great a favorite with the queen that he was appointed her secretary for foreign languages. (See *Mary Stuart.*) The distinction with which he was treated by his mistress soon excited the envy of the nobles and the jealousy of Darnley. A conspiracy, with the king at its head, was formed for his destruction, and before he had enjoyed two years of court

GOVERNMENT ROAD CONSTRUCTION CAR

A demonstration car which is sent about the country by the Office of Public Roads in co-operation with a railway company to illustrate the different types of road constr uction.

favor the Lord Ruthven and others of his party were introduced by Darnley into the queen's apartment, where they killed the object of their revenge, March 9, 1566. Popular tradition assigns to Rizzio the improvement of the Scottish style of music, but many of the airs which have been ascribed to Rizzio are easily traced to more distant periods.

Roach (rōch; *Leuciscus rutilus*), a species of fresh-water fish of the carp family (Cyprinidæ), found in many parts of Europe. Their average length is about 9 or 10 inches. They are



Roach (*Leuciscus rutilus*).

of a grayish-green color, the abdomen being silvery white and the fins red. The average weight of the roach is under 1 lb., and though a favorite with anglers, it is not much esteemed for the table. Allied fishes receive the same name in America.

Road (rōd), an artificial avenue of travel formed through a country for the accommodation of travelers and the carriage of commodities. Though the Romans set an example as road-builders, some of their public highways being yet serviceable, the roads throughout most of Europe were in a wretched condition till towards the end of the eighteenth century. France was in advance of other countries in roadmaking; in England and the United States a decided improvement of the highways did not begin until the nineteenth century. The first important point to be considered in roadmaking is the route to be followed, a matter in which natural obstructions and inequalities of level have to be taken into account, besides the question of directness of route, the deviations advisable in order to accommodate certain centers of population, the expense of upkeep, etc. Natural obstructions are overcome by special contrivances, such as bridges, embankments, tunnels, etc. When diversities of level are necessary, road-engineers fix the degree of inclination at the lowest possible point. Telford estimated the maximum inclination of a road to be 1 in 24, but except in extreme cases it is considered better that it should not exceed 1 in 50. The *angle of repose*, or maximum slope on which a carriage will stand, has been estimated at 1 in 40. The width of the road is also a very important consideration as bearing both on the original cost and on the permanent maintenance. A properly-constructed road, besides a foundation, consists of two layers, an upper and under. After a good foundation is obtained the laying of a base, the best material being concrete of gravel and lime, gives durability to the road. Upon this base the actual roadway is laid with a slight inclination from the center to the sides for the purpose of drainage. Before the time of Macadam it was customary to use broken stones of different sizes to form the roadway, the consequence being that in course of time the smaller stones sank, making the road rough and dangerous. Macadam early in the nineteenth century (see *Macadam*) introduced the principle of using stones of uniform size from top to bottom. (See also *Pavement.*) The general superintendence of roadways is usually exercised by the government of a country, but it entrusts the execution of its enactments to local authorities. Highways are public roads which every citizen has a right to use. They are constituted by prescription, by act of legislature, or by dedication to the public use. What is known as the *rule of the road* is that in passing other horsemen or carriages, when going in the opposite direction, the rider or driver in America must pass on the right; if going in the same direction, he passes to the left; in England he always passes on the left of the other. Much is being done of late years for the improvement of roads, and the roadways of the United States, formerly wretched in many parts of the country, are now being widely improved, many of those in the older parts of the country equaling the European roads. The system of tolls, levied on traffic to pay for the maintenance of roads, is now fast disappearing.

Road-steamers. See *Steam-engine.*

Roanne (ro-ȧn), a town in France, department of the Loire, on the left bank of the Loire, which is here navigable, 40 miles N. W. of Lyons. It is an important railway center, and manufactures woolen, linen and cotton goods. Pop. (1906) 33,981.

Roanoke (rō-an-ōk′), a city of Virginia, formerly of Roanoke Co., now independent, is situated on the Roanoke River, 55 miles W. by S. of

Lynchburg. It is in a stockraising, tobacco-growing and mining region and has a large trade. A village of a few hundred people in 1880, it had in 1910 a population of 34,874. It has extensive machinery, iron and steel, locomotive and car works, tobacco and canning factories, etc. It has many mineral springs in its vicinity, and is a health resort with a large sanitarium. The Virginia College is located here.

Roanoke (ro-an-ōk′), a river, United States, in Virginia and North Carolina. It flows chiefly southeast, and after a course of about 250 miles falls into Albemarle Sound. It is tidal for 75 miles and is navigable for double that distance for small vessels.

Roaring (rōr′ing), in horses, is a disease of the nerves and muscles of the larynx which causes an obstruction to the passage of air, giving rise, when the horse is briskly exercised, to the peculiar sound from which the disease derives its name. The cause of the disease is in most cases attributed to fatty degeneration and atrophy of the laryngeal nerve, which brings about an atrophy of the muscles of the larynx on the side affected, and thus causes the arytenoid cartilage to obstruct the passage. The disease generally affects the left side, and is not, as a rule, amenable to treatment. Several cases have been cured lately by excision of a portion of the affected arytenoid cartilage, and this operation promises to be very successful in this disease.

Roasting (rōst′ing), the cooking of meat by the direct action of fire — that is, by dry heat, either before the fire or in an oven. Roasting before an open fire is considered preferable to roasting in an oven (which is analogous to baking), on account of the free ventilation to which it exposes the meat during the process. The apparatus in most kitchens for open roasting are a fire, a pit, a contrivance for turning the meat to present all sides of it alternately to the fire, a screen to economize the heat, and a saucepan to catch the dripping. The fire must be kept even and bright throughout. During the process of roasting, the meat should be basted with the dripping to keep it soft and allow the heat to penetrate. The desirability of roasting as compared with boiling is that it retains the saline ingredients of the meat. The time allowed for roasting is roughly estimated at a quarter of an hour to 1 lb. of meat. Longer time is required in winter than in summer, and for new than old killed meat.

Robbery (rob′ėr-i), a felonious and forcible taking away another man's goods or money from his person, presence, or estate by violence or putting him in fear. Violence or intimidation is the criterion which distinguishes robbery from other larcenies; and it is sufficient that so much force or threatening, by word or gesture, is used as might create an apprehension of danger, so as to lead a man to part with his property against his will. Highway robbery, or the forcible taking of property from travelers, in many countries is a capital offense, and in all civilized countries is severely punished.

Robbia, Luca Della. See *Della Robbia.*

Robert (rob′ėrt), Duke of Normandy, surnamed *the Devil*, was the younger son of Duke Richard II by his marriage with Judith, a daughter of Count Godfrey of Brittany. In 1027 he succeeded his elder brother, Richard III, whom he is charged with having poisoned. The first years of his government were employed in bringing his rebellious vassals into subjection, and he then restored Count Baldwin of Flanders to his states, assisted Henry I, king of France, against his mother Constantia, and humbled Count Otho of Champagne. In 1034 his fleet was wrecked off Jersey while on its way to England to support his nephews Alfred and Edward against Canute, who had excluded them from the succession to the English throne. Hereupon he concluded a truce with Canute, by which the two princes were promised half of England. In 1033 he set out to visit the holy places, and subsequently made the pilgrimage to Jerusalem on foot. While returning he died suddenly at Nicæa in Asia Minor (1035), and is supposed to have been poisoned by his servants. His heroic deeds and penance have given rise to numerous stories. William the Conqueror was his son.

Robert I. See *Bruce, Robert.*

Robert II, King of Scotland, was the son of Marjory, daughter of Robert Bruce, and of Walter, steward of Scotland, and was thus the first of the *Stewart* or *Stuart* kings. He was born in 1316, and was recognized by parliament in 1318 as heir to the crown. On the death of David II he was crowned at Scone, March 26, 1371. He had long acted as regent, and had done good service in the English wars. An act of parliament in 1375 settled the crown on his sons by his first wife Elizabeth Mure of Rowallan, though illegiti-

mate by ecclesiastical law. His reign was comparatively a peaceful one, one of the chief events being the battle of Otterburn. He died in 1390.

Robert III, King of Scotland, eldest son of the preceding, was born in 1340 and was originally called John, but changed his name on his coronation, in 1390. Having been lamed by accident, he was unable to engage in military pursuits, and he trusted the management of affairs almost entirely to his brother, whom he created Duke of Albany. In 1398 Albany was compelled to resign his office by a party who wished to confer it on the king's eldest son, David, Duke of Rothesay. War was renewed with England, and the battle of Homildon Hill, September 14, 1402, resulted in a disastrous defeat of the Scots. In this year the Duke of Rothesay died in Falkland Castle, where he had been imprisoned; and it was commonly believed that he was starved to death at the instigation of Albany. Dread of Albany, who had recovered the regency, induced the king to send his second son, James, to France in 1406; but the vessel which carried him was captured by the English, and Henry IV long detained him as a prisoner. Soon after this event Robert died (1406).

Robert of Gloucester, an English historian, is supposed to have been a monk in the abbey of Gloucester during the reign of Edward I, but of his private history nothing is known. His *History of England*, in verse, extends from the period of the fabulous Brutus to about A.D. 1300, and its language is the transition stage of English previous to Chaucer. Its chief value is as one of the monuments of the English of this period.

Roberts, CHARLES GEORGE DOUGLAS, a Canadian author, born at Douglas, New Brunswick, in 1860. He was professor of literature at King's College, Nova Scotia, 1885-87, and of economics, 1887-95; associate editor of *The Illustrated American*, New York, 1895. His poems *Orian*, *In Divers Tones*, etc., brought him the title of 'The Longfellow of Canada.' He has also written works of history, novels, etc., and has been especially happy in dealing with stories of animal life. Among the latter are *The Heart of the Ancient Wood*, *The Kindred of the Wild*, *Hunters of the Silences*, etc.

Roberts, DAVID, painter, was born in Edinburgh in 1796; died in 1864. He was apprenticed to a house-painter, but, with a view to the higher branches of his art, he pursued the study of drawing and painting. After a seven years' apprenticeship he became a scene-painter, and in 1821 was engaged as painter for Drury Lane Theater. In 1826 he exhibited at the Royal Academy views of the cathedrals of Rouen and Amiens. Soon after he abandoned scene-painting, and 1832-33 visited Spain, publishing a selection of Spanish sketches in 1837. His *Destruction of Jerusalem* appeared in 1849; the *Inauguration of the Exhibition of All Nations*, 1853; *Rome*, 1855; *Christmas Day* and *St. Peter's at Rome*, 1856. In 1859 he published an illustrated volume entitled *Italy — Classical, Historical, and Picturesque.* Roberts is considered the best architectural painter Britain has produced, and as a painter of interiors he has few equals.

Roberts, FREDERICK SLEIGH, LORD, was born at Cawnpore, India, in 1832, son of General Sir Abraham Roberts. He entered the army and became a lieutenant in the Bengal Artillery in 1851; a captain in 1860. He gained the Victoria Cross in the Indian mutiny, and was made brevet-major. He took part in the Abyssinian war 1867-68, and in 1872 was knighted for his services in India on the Lushai expedition. He commanded a column in the Afghan war of 1878, and after a brilliant march from Cabul to Candahar utterly defeated Ayoub Khan. As a reward for these services he was created (1881) a baronet. General Roberts succeeded Sir Donald Stewart in the command of the Indian army, November 28, 1885. He was afterwards commander-in-chief of the Irish forces, and in 1900 was appointed to a like position of the British forces in the South African war. He returned in 1901, was made an earl and given the order of the Garter. Later he succeeded Lord Wolseley as commander-in-chief of the British armies.

Robertson (rob'ėrt-sun), FREDERICK WILLIAM, a celebrated preacher, was born in London in 1816. He attended the grammar-school of Beverley, and in 1830 became a pupil of the Edinburgh Academy, and afterwards attended the university of that city. Failing to obtain a commission in the army, he matriculated at Brasenose College, Oxford, in 1837, with a view of entering the church. From 1842 to 1846 he was curate at Christ Church, Cheltenham. He then went to Germany, and endeavored to acquaint himself with the views of German theologians. He became incumbent of Trinity Chapel, Brighton, in 1847; and continued in this

charge with increasing fame as a preacher till his death in 1853. His views on the Sabbath, the atonement, baptism, and inspiration were assailed as unorthodox, and he was accused of preaching democracy and socialism.

Robertson, JOSEPH, a Scottish antiquary, was born at Aberdeen in 1810; died in 1866. He was educated at the school of Udny, at Aberdeen Grammar School, and Marischal College, Aberdeen. In 1835 he published a humorous *Guide to Deeside*, under the pseudonym of John Brown. After serving as editor of several Scottish newspapers he became curator of the historical department of the Register House. The University of Edinburgh conferred on him the degree of LL.D. in 1864. His works include the *Book of Bon-Accord*, an archæological and historical guide to Aberdeen (1839), *Histories and Antiquities of the Counties of Aberdeen and Banff* (1843-62), *Inventory of Queen Mary's Jewels and Furniture* (1863), and *Concilia Scotiæ* (1866).

Robertson, THOMAS WILLIAM, an English dramatist, born in 1829; died in 1871. His parents being actors, he early went on the stage, but was never a success. In 1853 he settled in London, where for several years he struggled on with light literature. In 1864 he had considerable success with *David Garriek*, a play produced by Sothern; but his fame rests on a series of plays produced at the Prince of Wales' Theater (1866-70), including *Ours*, *Caste*, *Play*, *School*, and *M. P.* Though sneered at on their production by certain critics, and nicknamed 'cup-and-saucer dramas,' they deservedly secured a permanent place on the stage. His principal *Dramatie Works* (2 vols.) were published in 1890 by his son.

Robertson, WILLIAM, a celebrated Scottish historian, was born at Borthwick, in East Lothian, where his father was minister, Sept. 19, 1721. After the completion of his course in the theological class of Edinburgh, Robertson obtained a license to preach in 1741, and in 1743 was presented to the living of Gladsmuir, in East Lothian. He soon obtained an ascendency in the General Assembly of the Church of Scotland by his eloquence and great talents for public business, which, exerted in favor of Conservative principles, gave him for a long time the lead in the ecclesiastical politics of Scotland. His *History of Scotland During the Reigns of Queen Mary and King James VI* appeared in 1759 (two vols. 4to). This work led to the author's appointment as chaplain of Stirling Castle in 1759, one of the king's chaplains in 1761, and principal of the University of Edinburgh in 1762. Two years after he was made historiographer-royal of Scotland. His *History of the Reign of Charles V* appeared in 1769, his *History of America* in 1777, and in 1791 *An Historical Disquisition Concerning the Knowledge which the Ancients had of India.* As an historian he is admired for skilful and luminous arrangement, distinctness of narrative, and highly graphical description. His style is pure, dignified, and perspicuous. He died in June, 1793.

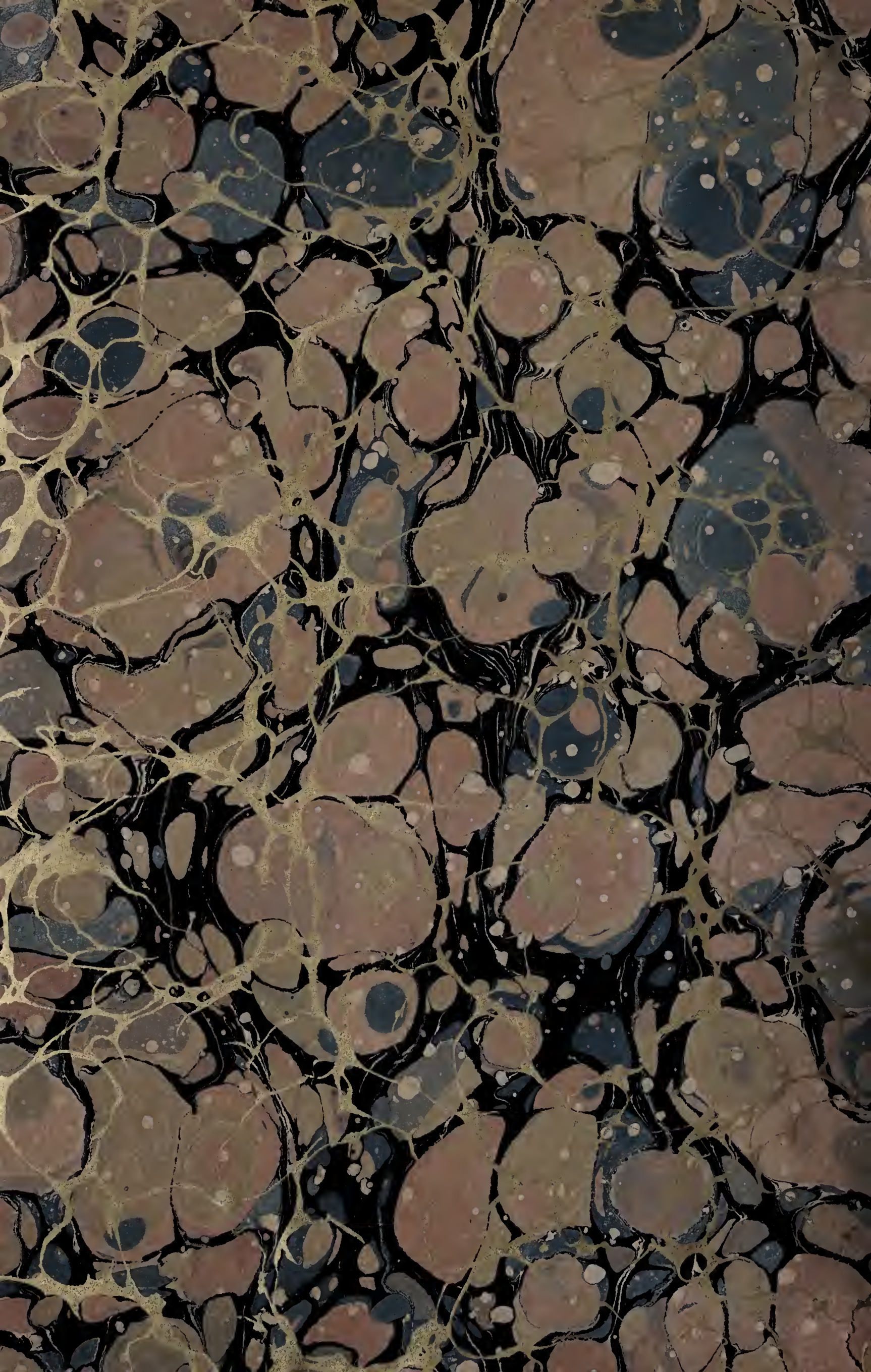
Robespierre (rob-es-pi-ār), FRANÇOIS MAXIMILIEN JOSEPH ISIDORE, was born at Arras in 1758, and was the son of an advocate. He was educated at the College of Louis-le-Grand at Paris. He afterwards practiced as an advocate at Arras, and held for a short period the position of judge in the bishop's diocese. In 1789 he was elected deputy to the States-general, and was a zealous supporter of democratic measures. At this time he became a

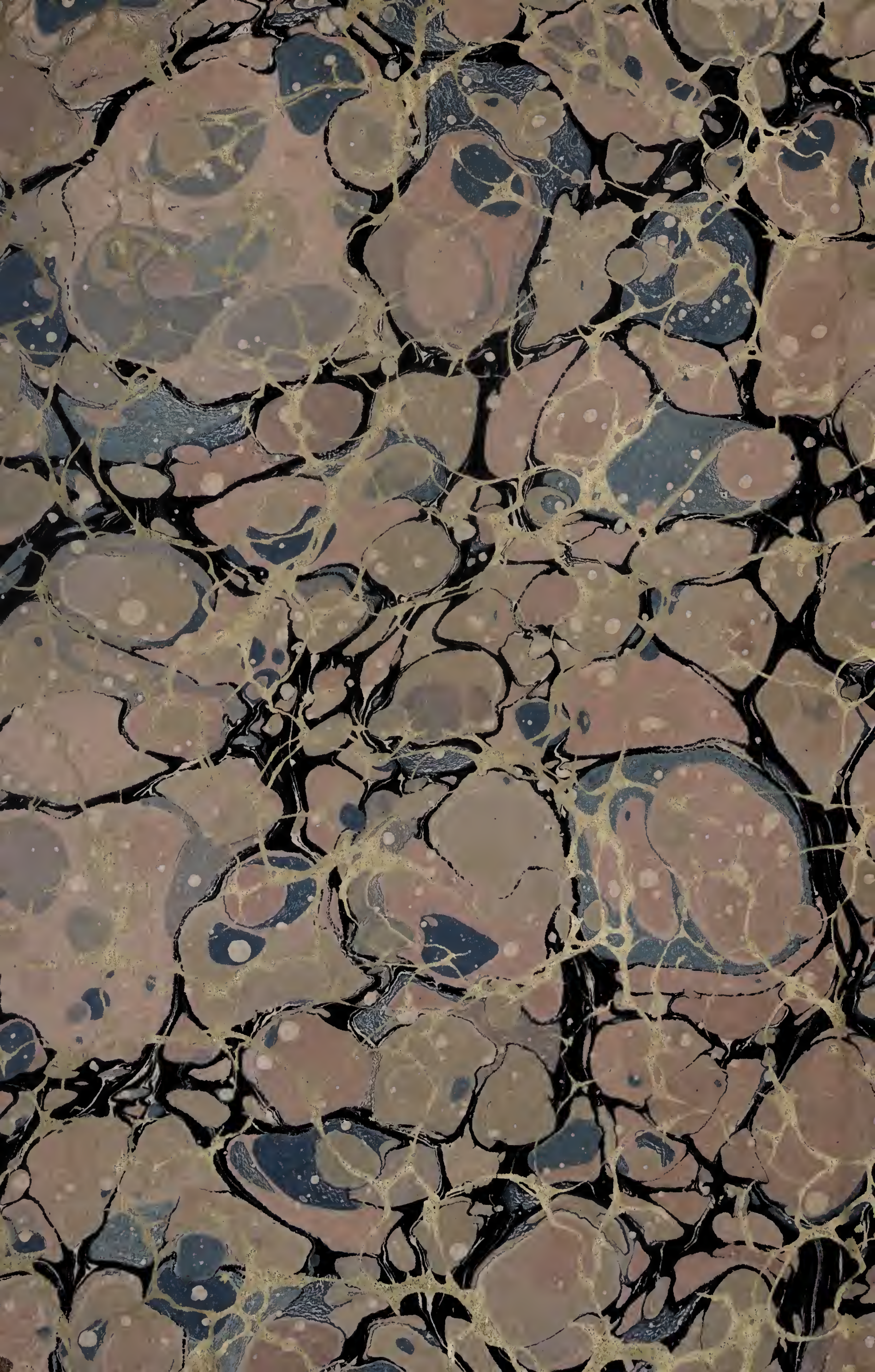
Maximilien Robespierre.

prominent member of the Jacobins and other revolutionary clubs. In March, 1791, he was appointed public accuser to the New Courts of Judicature. He remained in the background during the September massacres of 1792, which he assisted in planning, leaving the work with Marat and Danton. In the same month he was elected a member of the Convention, and in the proceedings against Louis XVI distinguished himself by the relentless rancor with which he

opposed every proposal to avert or delay the fatal result. On March 19, 1794, the Hébertists (see *Hébert*) fell victims to his jealousy. Eleven days later he caused the arrest of Danton, who, after a trial of three days, was guillotined, together with Camille Desmoulins, on April 5th. Robespierre's power now seemed to be completely established, and the Reign of Terror was at its height. On June 8, 1794, he, as president of the Convention, made the convention *decree* the existence of the Supreme Being; and on the same day he celebrated the Feast of the Supreme Being. In the meantime a party in the Convention was formed against Robespierre, and on July 27 he was openly accused of despotism. A decree of arrest was carried against him, and he was thrown into the Luxembourg prison. He was released by his keeper on the night of the same day, and conducted to the Hall of Commune, where his supporters were collected. On the following day Barras was sent with an armed force to effect his arrest. Robespierre's followers deserted him, and he was guillotined on July 27, 1794, together with some twenty-three of his supporters. The tendency with modern writers is to modify the character for infamy which at one time obtained regarding Robespierre.

SEP 25 1918





LIBRARY OF CONGRESS
0 038 701 312 A